THE IRON TRADE REVIEW

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Little Cessation in Activity During Holidays

Mills Generally Resume the Day After Christmas—Heavy Buying of Rails and Cars at Early Date Expected

Business transacted during the holiday season never furnishes a safe basis for predicting the degree of prosperity which will prevail later in the year, but the length of vacations given employes of the mills indicates the pressure for the filling of orders already placed. This year, nearly all the mills of the central west rolling steel products resumed on the day following Christmas, but iron mills are operating very irregularly and at some steel mills in the eastern territory the period of idleness will be more extended than in the central west. Cessation of operations of the various plants of the United States Steel Corporation will be shorter than for a number of years past. Orders had originally been issued for the banking of nine blast furnaces from Dec. 23 to Dec. 31, but these have been rescinded and but two furnaces of the Edgar Thomson group will be banked. During the past three or four weeks, the shrinkage of pig iron stocks of the Corporation has amounted to about 50,000 tons. Another furnace of the Ohio group at Youngstown has been ordered into blast. It is expected that shortly after Jan. 1 the general operations of the Steel Corporation will be considerably increased. The Columbus plant, recently put in readiness, is awaiting orders for resumption and these will probably be forthcoming about the middle of January.

Iron Ore

Sales of eastern domestic ore for delivery over next year have been made, amounting to about 150,000 tons, for consumption of eastern blast furnaces. These are the first sales for 1912 delivery. The sellers of Lake Superior iron ores are not making any effort to contract at present, but favor waiting until market conditions develop more clearly and determine whether present prices will be asked for the new ore.

Pig Iron

There has been some decline in demand, owing to the influence of the holidays, but a very fair tonnage has been disposed of during the past week. The American Locomotive Co., which has been buying for its various plants, has completed its purchases by contracting for from 10,000 to 15,000 tons of foundry and basic grades for first half delivery. The business was divided among Buffalo, New York state and Virginia makers. The American Steel & Wire Co. has bought 3,000 tons of low phosphorus and the General Electric Co. 2,000 tons of the same grade. Considerable inquiry for basic is pending in the Pittsburgh and Cleveland districts. Some of this comes from brokers. A sale of 1,500 tons of basic has been made at Pittsburgh, at $12.45, valley. Sales at Chicago include 15,000 tons of malleable and 2,000 tons of charcoal. The Bessemer market is quiet, the principal inquiry being for 4,000 tons at Pittsburgh, for shipment to the east. The Steel Corporation has decided not to close on its inquiry for 6,000 tons of ferro-silicon, for which it was asked about $68 by makers, an advance of $15 over its last year's contract.

Sheets and Tin Plate

Liberal specifications against sheet contracts are being received by the mills and production is increasing. New business is not heavy. The recent quotations are apparently well maintained. Tin plate mills are operating at about 75 per cent of capacity and will probably increase to about 90 per cent within the next 30 days. Mill orders of the rail and billet bureau of the leading interest for December exceed by over 50,000 tons those of November. The crude steel market is firmer than for several months and some sales are being made at higher prices.

Railroad Buying

Canadian railway mills are so well supplied with orders that it is predicted that considerable tonnage will come to this country from across the border. Two thousand tons were placed this week by a Canadian line with the Steel Corporation. The Dominion Iron & Steel Co., Ltd., and the Algoma Steel Co. have sufficient tonnage to keep their plants busy until fall. It is confidently expected that one of the great systems of the United States will place a very large rail order within a day or two. There is good reason for believing that the car buying which has already been done will be followed by much more liberal orders. Rail orders for delivery next year now amount to about 300,000 tons. The Soo Line has contracted for 18,000 tons of rails from the Illinois Steel Co. The Maryland Steel Co. has an order for 4,500 tons for the National Railway of Mexico. The Illinois Central has ordered 500 box cars from the American Car & Foundry Co., which has also taken an order for 157 steel coaches from the New York Central. The Rock Island is figuring on 300 freight and some passenger cars. Pennsylvania lines east are inquiring for from 3,000 to 6,000 freight cars and the lines west for 8,000 cars. The Bessemer & Lake Erie and Union railroads, Steel Corporation properties, will soon close for 2,000 hoppers and gondolas.

WORLD'S IRON MARKETS

PITTSBURGH

Mills Resume Promptly After Christmas—Pig Iron Quiet.

Office of THE IRON TRADE REVIEW;
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Owing to heavy orders passed for entry on mill books this month, practically all of the steel mills in this section resumed operations this morning after the Christmas holiday, and, contrary to expectations on Dec. 1, the year-end season will have little effect upon production this month. In several branches of the steel trade production in December reached the high point of the year, and, with liberal specifications received during the past 10 days, prospects are bright for a further extension in mill activities in January. This is particularly true of the sheet and tin plate industry, as arrangements are now being made to operate practically all serviceable mills of the leading interest and independents. Fresh buying, especially on the part of the railroads, has fallen off slightly owing to the holiday season, but the larger companies report that daily bookings during the week have been in excess of mill capacity.

Aside from the higher prices quoted on billets and sheet bars, no further advances in prices of steel products have been made. A few of the larger companies having well filled order books are now quoting 1.20c, Pittsburgh, as the minimum on plates, shapes and steel bars, but this figure is still being shaded $1 a ton by some mills. A feature of the market is the rapid advance in the price of spot furnace coke, due largely to the curtailment in production owing to the holidays and the shortage of labor. A sale of 4,000 tons is reported at $1.80, ovens, as compared with $1.50, ovens, at the beginning of the month. The pig iron market is firmer and a fair amount of iron is under active negotiation. No. 2 foundry iron has been sold to a nearby consumer at $14.25, delivered, and an eastern consumer has closed for 1,500 tons of basic at a slightly higher price. The scrap market is seasonably quiet.

The Pittsburgh Steel Co., during the week, awarded a contract to the Garrett - Cromwell Engineering Co., Cleveland, for two blast furnaces to be built at Monessen, Pa. The company will also build four additional open-hearth steel furnaces and merchant bars mills, plans for which have not been made public.

Definite announcement is expected within the next fortnight with regard to orders for standard steel rails and freight cars by some of the larger trunk lines referred to a week or so ago.

Pig Iron.—The pig iron market has quieted down somewhat on account of the inventory period, but there is a fair tonnage under active negotiation for forward delivery. An eastern buyer has closed with a valley furnace for 1,500 tons of basic iron for second quarter shipment at $12.45, valley, the iron carrying a heavy freight rate. Conflicting statements are still being made concerning the tonnage of basic under negotiation and purchased this month. It is stated, however, that the Pittsburgh Steel Co. has not purchased any iron for delivery at Monessen, Pa., after Dec. 31, and that the American Rolling Mill Co. has not closed on its inquiry previously referred to. The awarding of contracts for two blast furnaces at Monessen for the Pittsburgh Steel Co. means the elimination within the next year of the largest buyer of basic pig iron in this market.

An eastern steel company this week entered the market for 4,000 tons of Bessemer iron to be delivered at the rate of 1,000 tons a month beginning with January. This is the largest general inquiry for Bessemer iron pending at present. The market appears to be firm at $14.25, valley. The foundry iron market is attracting a great deal of attention, owing to the extremely low stocks being carried on furnace yards. We note a sale of 2,500 tons for delivery over the next three or four months at $14.25, delivered, equivalent to $13.35, valley. This iron, however, will not come from valley furnaces. No. 2 foundry is very firm at $13, valley, and it is doubtful whether much iron could be picked up at this figure. The Westinghouse Air Brake Co. has not closed on its inquiry noted last week. The market on gray forge is firmer and is quotable at $12.75, valley. There is little activity in malleable iron. We quote the market as follows:

(Prompt Shipment.)

Bessemer, valley	$14.25
Bessemer, Pittsburgh	15.15
Basic, valley	12.45
Basic, Pittsburgh	13.35
No. 2 foundry, Pittsburgh	13.90
Gray forge, Pittsburgh	13.65
Malleable, Pittsburgh	13.65

(First Quarter.)

Bessemer, valley	$14.25
Bessemer, Pittsburgh	15.15
Basic, valley	12.45
Basic, Pittsburgh	13.35
No. 2 foundry, Pittsburgh	13.00
Gray forge, Pittsburgh	13.65
Malleable, Pittsburgh	13.65

Sheets.—Liberal specifications have been received against contracts for sheets previously made for delivery over the first quarter and the indications are that all of the serviceable mills of the leading interest and independents will be in operation by the latter part of January. Operations have been increased slightly this week and will be extended next week. The market is quotable at the higher prices announced several days ago, although slight concessions are still being offered by some western mills. Application has been made for a charter for the Association of Sheet and Tin Plate Manufacturers with 15 charter members representing independent sheet and tin plate mills. It is stated that the new association will not seek to control prices. We quote the market as follows, with $1 a ton added as the delivered price in the Pittsburgh district:

Blue annealed sheets No. 10 gage, 1.40c; black annealed sheets No. 28 gage, 1.90c; galvanized sheets, No. 28 gage, 2.90c; painted roofing sheets, $1.35 per square for No. 28 gage, 2½-inch corrugation; galvanized roofing sheets, $2.45 to $2.50 per square for No. 28 gage, 2½-inch corrugation, f. o. b. Pittsburgh.

Tin Plate.—Tin plate mills are operating at about 75 per cent of capacity this week and it is expected that operations will be increased to 90 per cent within the next 30 days.

This will be equivalent to 100 per cent a few years ago owing to the new mills completed recently. The Jones & Laughlin Steel Co. this week is operating four of its new unit of 12 tin mills completed recently at Aliquippa, Pa. The remaining eight mills will be placed in service next week. There is not a great deal of fresh buying at present, as most large users are under contract for first half requirements. We quote the market as follows:

Coke tin plate, 100-pound basis, 14 x 20, $3.40 f. o. b. mill, Pittsburgh district.

Rails and Track Material.—Steel rail orders for 1912 delivery are not coming out very freely, but some of the larger railroads are figuring on heavy orders for standard railroad expected that some large orders will be placed shortly after the first of the year. The Carnegie Steel Co. will roll 17,000 tons of the 40,000 tons of rails ordered by the Baltimore & Ohio railroad. The outlook for the steel rail market is decidedly brighter than at this time last year. Some fairly large orders for light rails have been placed in this market. Some of the larger railroads are figuring on heavy orders for standard railroad spikes and some fair orders have been placed for first quarter shipment at $1.40, Pittsburgh. The market is quoted as follows, the base price on open-hearth steel rails being 1.34c per pound, at the mill:

Fifty-pound and heavier, 1.25c per pound; carloads and less than 500 tons, 1.34c per pound; light rails on base weight of 40 to 45 pounds, 1.16c, the schedule on the other weights being irregular and subject to negotiations; angle splice bars for standard sections, 1.50c, Pittsburgh; track bolts, 2.20c to 2.25c, Pittsburgh.

Railroad Spikes.

4½, 5 and 5½ and 9/16	$1.40
3, 3½, 4, 4½ and 5 x ½	.10
3½, 4 and 4½ x 7/16	.20
3, 3½, 4 and 4½ x 3/8	.30
2½ x ¾	.40
2½, 3 and 3½ x 5/16	.60
2 x 5/16	.80

Steel.—The semi-finshed steel market is firmer than in several months and sales are being reported at higher prices. Some of the larger companies which are operating to capacity and which are filled up for the next 60 days are now quoting $20 on Bessemer and open-hearth billets, and $21 for Bessemer and open-hearth sheet bars, f. o. b. Pittsburgh or Youngstown, although these figures could probably be shaded 50 cents a ton at some of the smaller mills. Mill orders in December will exceed those of the preceding month by a large margin. A number of contracts have been extended to cover the first quarter, and with liberal specifications received this month, for shipment in January, production next month promises to exceed that of any corresponding period in more than a year. Quotations on billets and sheet bars follow:

Bessemer 4 x 4 billets with 0.25 carbon and less are quoted at $19.50 to $20, with the usual extras for size and analysis, and open-hearth rolling billets, $19.50 to $20, Bessemer sheet and tin bars are quoted at $20.50 to $21, and open-hearth sheet bars are quoted at $20.50 to $21, f. o. b. Pittsburgh or Youngstown, with full freight to destination added. Forging billets are quoted at $25, Pittsburgh.

Hoops and Bands.—Specifications against contracts for hoops and bands are fair, but fresh buying is comparatively light. Prices are firm. We quote the market as follows:

Hoops in carload lots, 1.30c, Pittsburgh; in less than carload lots, 1.40c; bands, 1.15c to 1.20c, base, with net extras, as per standard steel.

Merchant Bars.—Heavy tonnage of steel bars has been booked this month and some of the larger companies are well filled with orders for delivery over the first quarter. Two large companies in this section report that the volume of business booked in December exceeds that of any single month this year. The market appears to be firm at 1.15c, Pittsburgh, for early shipment. There is a little better demand for bar iron. Liberal specifications for shafting are being received from implement makers and automobile builders and fresh buying also shows some improvement. We quote the market as follows:

Common iron bars, 1.25c to 1.30c, Pittsburgh; Bessemer and open-hearth steel bars, 1.15c to 1.20c; plow and cultivator, 1.25c; channels, angles, zees, tees, under 3 inch, 1.25c, all f. o. b. mill. The following differentials are maintained on steel: Less than 2,000 pounds of a size, 0.35 advance. Cold rolled and ground shafting, 65 per cent off in carloads and 60 and 10 per cent in less than carloads, delivered in base territory.

Muck Bar.—Some new inquiries for muck bar are appearing and scattered sales of carload lots are reported. We quote muck bar at $27.50 to $28, Pittsburgh.

Structural.—Structural lettings this week have been light and consist chiefly of small lots ranging from 100 to 300 tons. Some awards which it was originally intended to hold up until after the first of the year likely will be placed this week as a result of the higher prices being quoted on structural steel by the mills and reports of a further advance early in the next year. The American Bridge Co. has received a contract from the Chesapeake & Ohio railroad for a new bridge which will require 3,000 tons of steel. Two large steel companies have withdrawn 1.15c on structural steel and are now quoting 1.20c to 1.25c, Pittsburgh, but some business is still being placed at the former price. We quote the market as follows:

Beams and channels, 15 inches and under, zees, 1.15c to 1.20c; tees, 1.15c to 1.20c; angles, from 3 to 6 inches, 1.15c to 1.20c; over 6 inches, 1.25c; universal and sheared 1.15c to 1.20c; over 15 inches, 1.25c to 1.30c, plates, 6¼ inches wide and wider, 1.25c.

Ferro-Alloys.—A central Pennsylvania steel company has closed on its inquiry for 600 tons of 50 per cent ferro-silicon for delivery over 1912. The market appears to be firm at $70, Pittsburgh. A few small lots of ferro-manganese have been sold in this market at the new price of $41, seaboard, announced last week. The recent advance in price of this material has brought out more inquiry for forward delivery, but it is believed that most of these have been put out for the purpose of testing the market.

We quote ferro-manganese nominally at $41, Baltimore, for prompt and forward delivery. The freight rate from Baltimore to Pittsburgh is $1.95 per ton.

Fifty per cent ferro-silicon is quoted at $70, Pittsburgh, for prompt and forward delivery; 12 per cent, $22.50 to $23; 11 per cent, $21.50 to $22; 10 per cent, $20.50 to $21, f. o. b. Globe, Jisco and Ashland furnaces. The freight rate to Pittsburgh is $1.90. The foreign grades are held at $1 or more a ton over domestic prices.

Plates.—There has been a temporary lull in fresh buying of plates on account of the holiday season. No important car awards have been made but several railroads which have not figured in car buying during the past few months are actively figuring upon a large number of cars and some awards are expected within the next week or so. It is expected that some action will be taken within the next fortnight on the inquiry put out recently by the Pennsylvania railroad. Practically all of the larger plate mills resumed this morning after the Christmas holiday and have heavy tonnage on their books which will insure steady operation over the next 60 days. Some of the larger companies which have well filled order books are quoting 1.20c to 1.25c, Pittsburgh, and a few orders have been placed at 1.20c, Pittsburgh, but this price is being shaded $1 a ton by the smaller mills which have not been directly benefited by recent car buying. We quote the market as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches, 1.15c to 1.20c. Extras are as follows, per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. and ordinary firebox steel plates,

0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end being not less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ¼ inch to and including $\frac{3}{16}$-inch plate on thin edge, 0.10c; under $\frac{3}{16}$ and including No. 9, 0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Merchant Pipe. — Specifications against contracts for merchant iron and steel pipe this month have been fairly satisfactory and prices are firm. Some important inquiries for line pipe are pending, but no large awards have been made during the past week. We quote the following official discounts in car load lots, subject to the usual preferential discounts to the larger buyers, merchant pipe, where specified, being offered in from ⅛ to 6 inches.

Iron and Steel Pipe Basing Prices.

	Steel.		Iron.	
	Butt weld.			
	Black.	Galv.	Black.	Galv.
⅛, ¼ inch	74	54	68	48
⅜ inch	75	65	69	59
½ inch	78	68	72	62
¾ to 1½ inch	81	73	75	66
2 to 3 inches	82	75	76	69
	Lap weld.			
2 inches	79	72	72	65
2½ to 4 inches	81	72	74	67
4½ to 6 inches	80	72	73	65
7 to 12 inches	77	68	71	61
13 to 15 inches	55	..	47	..
Extra Strong, Plain Ends.				
	Butt weld.			
⅜, ¼, ½ inch	70	60	65	55
½ inch	75	69	70	64
¾ to 1½ inch	79	73	74	68
2 to 3 inches	80	74	75	69
Extra Strong, Plain Ends.				
	Lap weld.			
2 inches	76	70	71	65
2½ to 4 inches	81	74	74	67
4½ to 6 inches	77	71	72	66
7 to 8 inches	70	60	65	55
9 to 12 inches	65	55	60	50
Double Extra Strong, Plain Ends.				
	Butt weld.			
½ inch	65	59	60	54
¾ to 1½ inch	68	62	63	57
2 to 3 inches	70	64	65	59
Double Extra Strong, Plain Ends.				
	Lap weld.			
2 inches	66	60	61	55
2½ to 4 inches	68	62	63	57
4½ to 6 inches	67	61	62	56
7 to 8 inches	60	50	55	45

Plugged and reamed pipe is furnished at 2 points higher price, either butt or lap weld.

Boiler Tubes.—Some fair sized contracts for merchant and locomotive boiler tubes have been placed during the past ten days and the market, as a whole, is slightly firmer. Official discounts on steel and charcoal boiler tubes in car load lots follow:

Steel:

1¼ to 2¼ inch	65
2½ inch	67½
2¾ to 3¼ inch	72
3½ to 4½ inch	75
5 and 6 inch	67½
7 to 13 inch	65

Charcoal Iron:

1¼ inch	48
1¾ to 2¼ inch	50
2½ inch	55
2¾ to 5 inch	60

To destination east of Mississippi river will be sold at delivered discount for carloads lowered by 2 points, for lengths 22 feet and under; longer lengths, f. o. b. Pittsburgh. Usual extras to jobbers and boiler manufacturers.

Wire Products.—Mills report that orders for wire products are coming in at a slightly better rate than last month and some fairly large contracts have been made for delivery over the first 60 days of the new year. Wire mill operations will be extended next week as a result of the heavier specifications received this month. Prices appear to be firm and the new quotations of $1.55 for wire nails, and $1.35 for plain wire, Pittsburgh, for jobbers' carload lots, are being quoted only on orders for delivery within 60 days from receipt of order. Reports are heard of another advance of $1 a ton, effective Jan. 2, but so far no announcement has been made by manufacturers with regard to a new card. Demand for cut nails is only fair. We quote the market as follows:

Wire nails, jobbers, carload lots, $1.55; retailers' carload lots, $1.60; cut nails (western makers), jobbers' carload lots, $1.50; painted barb wire, jobbers' carload lots, $1.55; retailers' carload lots, $1.60 with 30c for galvanizing; plain wire to jobbers in carloads, $1.35; and to dealers, in carloads, $1.40; polished staples, $1.55; galvanized staples, $1.85.

Wire Rods.—Some contracts for wire rods have been made for delivery over the first quarter, but the market as a whole is not showing much activity. We quote $24.50 to $25, Pittsburgh, for Bessemer and open-hearth wire rods.

Coke.—Owing to a shortage of labor in the Connellsville coke region and the curtailment in production during the year-end period, the price of spot furnace coke has advanced rapidly since Dec. 1. Two or three sales involving about 1,000 tons each were made last week at $1.75, ovens, and during the past few days a consumer west of Pittsburgh bought approximately 4,000 tons at $1.80, ovens. Reports are also heard of sales at $1.90 to $1.95, ovens, but details are lacking. The market today is quotable at 20 cents a ton above the highest mark this year prior to Dec. 1. While the general tone of the market is decidedly firmer, it is expected that there will be at least a slight reduction in prices following the holiday season. Some additional contracts for foundry coke have been made and the market is stronger, most sellers now asking $2, ovens, as the minimum on spot coke. During the past 10 days, additional contracts for furnace coke for delivery over the first half and for the full twelve months have been negotiated, but little information regarding prices and tonnage involved is available at present. We quote standard Connellsville furnace coke for prompt shipment at $1.75 to $1.80, ovens, and on contract nominally at $1.75, ovens. On high grade Connellsville foundry coke, we quote $2, ovens, for prompt shipment, and from $2 to $2.25, ovens, for forward delivery. The Connellsville *Courier's* figures for the week ending Dec. 16, show 26,079 active ovens with an output of 318,234 tons, compared with 26,014 active ovens and a production of 319,130 tons the previous week.

Old Material.—This market has been rather quiet during the week, as buyers are not inclined to take heavy shipments until after the first of the year. Some contracts have been made for first quarter shipment, the bulk of the material involved in these transactions coming from sheet and tin mills. The embargo against shipments to a number of consumers in this section likely will be lifted next week. Prices are not quotably higher, but are firmer than a week ago. The Pennsylvania and other roads will issue their regular monthly scrap lists next week and January offerings are expected to be much heavier than in December. We quote, gross tons, delivered in the Pittsburgh district, including Monessen, Sharon, Steubenville, Brackenridge and Follansbee, as follows:

Heavy melting scrap	$12.25 to 12.75
Rerolling rails	12.75 to 13.00
Malleable	12.00 to 12.50
Bundled sheet scrap	10.50 to 11.00
Iron axles	20.00 to 21.00
Old iron rails	15.00 to 15.50
Stove plate	9.00 to 9.50
No. 1 wrought scrap	12.50 to 13.00
Old car wheels	12.50 to 13.00
Low phosphorus	14.50 to 15.00
Machine shop turnings	9.25 to 9.75
Cast borings	9.00 to 9.25
No. 1 cast scrap	12.50 to 12.75

Mills Well Supplied with Specifications—Prices Firm.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Blk., Dec. 26.

There has been practically no slowing down in orders for finished steel due to the holidays, although pig iron buying has decreased to some extent. The leading plate mills in this territory now have sufficient business to carry them for ten weeks, if no fur-

ther orders are placed, and the structural and merchant mills are in almost as good condition. Prices of finished materials show considerable firmness. The Soo Line has purchased 15,000 tons of rails from the Illinois Steel Co.; the order from the Northwestern Line, 60,000 tons, has not yet been placed, reports to the contrary notwithstanding, but it is likely that this business will soon be formally entered. The Rock Island Lines are figuring on 3,000 freight cars and some passenger cars. The Chicago, St. Paul, Minneapolis & Omaha is reported to have ordered 500 box cars and 100 refrigerator cars from the American Car & Foundry Co. The city of Portland, Ore., has let a contract for 8,200 tons of water pipe to the United States Cast Iron Pipe & Foundry Co., and has let 4,800 tons to the Oregon Iron & Steel Co. The scrap market is receiving satisfactory support from melters of steel and liberal buying is maintaining the advances which have been noted during the past few weeks.

Pig Iron.—There has been some slowing up in the demand for southern iron, due to the holiday season. Nevertheless, the market is still quite active and we note a recent sale of 2,500 tons of No. 2 at $14.35, Chicago, for first quarter delivery and numerous sales of smaller lots. One encouraging feature of the market is the reordering which is quite general. Northern iron, particularly malleable grades, is moving very satisfactorily in spite of the holiday dullness. At least 15,000 tons of malleable for first half shipment were sold in the Chicago territory during the past week and we also note a sale of 2,000 tons of Lake Superior charcoal. Buying of northern iron, however, is not on a sufficient scale to influence prices and the furnaces do not expect any readjustment in quotations in the near future.

The following prices represent the market for Chicago delivery, except Northern No. 2 foundry and malleable Bessemer, made in local furnaces, which are quoted f. o. b. furnace:

(First Half Shipment.)

Lake Superior charcoal	$16.50
Northern foundry No. 2	14.00
Southern foundry No. 2	14.35
Southern silveries, 5 per cent silicon	15.60
Jackson Co. silveries, 8 per cent	17.40
Malleable Bessemer	14.00
Alabama basic	14.35

Billets. — Specifications are lighter on account of the fact that buyers do not wish to load up their yards just previous to taking their annual inventory. Prices remain firm and unchanged. We quote, open-hearth forging billets, $26.00, Chicago; rerolling billets, $22.50.

Structural Material.—The mills are well supplied with business and prices are being well maintained, although local prices are a little below the Pittsburgh quotations, plus the freight to Chicago. The city of Portland, Oregon, has let a contract for the Broadway bridge over the Willamette river to the Pennsylvania Steel Co. This is the largest bridge order which has been reported in the west for some time, 7,270 tons of structural material being involved. Christopher & Simpson have taken a contract from the William Lemp Brewing Co., St. Louis, for an addition to their bottling house, 272 tons. The Minneapolis, St. Paul & Sault Ste. Marie railroad has let 907 tons to the Milwaukee Bridge Co. for an ore dock extension. The American Bridge Co. has taken a contract for a foundry building, 765 tons, from the Greenlee Foundry Co., Chicago. The Hurley-Mason Co., Tacoma, has let contracts for a shed, 190 tons, and for steel flues for a smelter, 130 tons.

We quote, structural material, f. o. b. Chicago, as follows:

Beams and channels, 15 inches and under, 1.30c to 1.38c. For extras, see Pittsburgh report.

Plain material out of town is as follows:

All angles, 3 inches and larger, including 6 inches, $1.60 to $1.65 per 100 pounds; angles over 6 inches, $1.70 to $1.75 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.60 per 100 pounds, base; channels, 3 inches and larger, $1.60 per 100 pounds, base.

Rails and Track Fastenings.—It is understood the Soo line has purchased 15,000 tons of rails from the Illinois Steel Co. The Northwestern is about to place 60,000 tons, but up to the time this report was written had not made any definite arrangements regarding its requirements. Business in track supplies is good and mills are operating on better schedules. While rail orders up to date have not been as good as was expected, nevertheless sufficient business has been booked to keep the mills operating at a fair rate.

We quote, light rails, f. o. b. Chicago, and track fastenings, f. o. b. Joliet, as follows:

Light rails, carloads, 40 to 45-pound, 1.16c to 1.20½c; 30 to 35-pound, 1.19½c to 1.24c; 16, 20 and 25-pound, 1.20½c to 1.25c; 12-pound, 1.25c to 1.29½c.

Light section relayers, 45 pounds and under, subject to inspection, $21 to $23; standard section relaying rails, subject to inspection, $23.50 to $24.

Track fastenings, f. o. b. Joliet, angle bars, 1.50c; railroad spikes, 1.50c to 1.55c, smaller size spikes, 1.65c, base; track bolts with square nuts, 1.90c base.

Plates.—The minimum price on plates for immediate shipment in moderate quantities remains at 1.30c, Chicago, although contracts for future delivery are being executed at 1.33c and 1.30c, equivalent to 1.15c and 1.20c, Pittsburgh. The lower prices will be made only on attractive tonnages which are in every way satisfactory to the mills. The mills in this district have sufficient orders on hand to operate at capacity for the next ten weeks, even if no further business were received. Plate buying from general sources is increasing. Car purchases continue to be one of the features of the western plate market. The Great Northern is making inquiries for 40 refrigerator cars and the Canadian Pacific is in the market for 200 of the same type. The Rock Island lines are figuring on 3,000 freight cars and some passenger cars. The Illinois Central has ordered 500 box cars from the American Car & Foundry Co for the Central Railroad of Georgia. The Chicago, St. Paul, Minneapolis & Omaha is reported to have ordered 500 box cars and 100 refrigerator cars from the American Car & Foundry Co.

We quote, f. o. b. Chicago, as follows:

Tank plates, ¼ inch thick, 6¼ to 100 inches wide, 1.30c to 1.38c. For extras, see Pittsburgh report.

Store prices are as follows:

Tank steel, ¼ inch and heavier, up to 72 inches wide, 1.60c.

Sheets.—Sheet makers in the west will close the year with much heavier tonnages on their books than they had at the same time a year ago. Orders for current rolling and specifications on contracts are good and prices, which have been weak, are showing a marked improvement.

We quote store prices, f. o. b. Chicago, as follows:

Blue annealed, No. 10, 1.95c; No. 12, 2.05c. Box annealed, No. 28, 2.40c. Galvanized, No. 28, 3.35c.

For mill prices, see Pittsburgh report. Freight to Chicago, 18 cents.

Wire Products.—While conditions surrounding the market on wire products have been unsatisfactory during the last few months, there has been a decided increase in specifying recently and the new prices are apparently well maintained. Jobbers in the west, with the exception of the extreme northern tier of states, are buying agricultural wire and fencing freely.

We quote, f. o. b. Chicago, as follows:

Wire nails, jobbers' carload lots, $1.73;

retailers' carload lots, $1.83; retailers' less than carload lots, $1.93; painted barb wire, jobbers' carload lots, $1.73; retailers' carload lots, $1.83; retailers' less than carload lots, $1.93, with 30c for galvanizing; plain wire, jobbers' carload lots, $1.53; retailers' carload lots, $1.58.

Merchant Pipe and Tubes.—Mild weather is stimulating building operations in Chicago and a large number of moderate priced structures which will, in the aggregate, require a heavy tonnage of the more commonly used sizes of merchant pipe, are under construction. Sales of merchant pipe in this market during December will make a better showing than November and are more satisfactory than they were a year ago. There is a moderate movement of tubes, both out of store and by direct shipment from mills.

We quote, merchant pipe and tubes, out of store, f. o. b. Chicago, as follows:

IRON AND STEEL PIPE BASING PRICES.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
Butt.				
⅛ inch and ¼ inch.	71.2	50.2	63.2	42.2
⅜ inch	75.2	64.2	66.2	55.2
½ inch to 1½ inch.	78.2	69.2	71.2	62.2
Lap.				
2 inch	76.2	68.2	68.2	60.2
4½ inch to 6 inch..	77.2	68.2	69.2	60.2
Card Weight.				
7 inch to 12 inch...	74.2	63.2	67.2	56.2
Extra Strong Plain Ends.				
Butt.				
⅛, ¼, ⅜ inch	66.2	54.2	60.2	48.2
½ inch	71.2	59.2	65.2	53.2
2 inch to 3 inch...	76.2	64.2	....	....
Lap.				
2 inch	72.2	60.2	66.2	54.2
7 inch to 8 inch....	66.2	54.2	60.2	48.2
Double Extra Strong.				
Butt.				
¼ inch	59.2	47.2	....	....
¾ inch to 1½ inch.	62.2	50.2	....	....
Lap.				
2 inch	60.2	48.2	....	....
4½ inch to 6 inch..	61.2	49.2	....	....
7 inch to 8 inch....	54.2	42.2	....	....

Tubes.

	Lap weld steel.	Charcoal iron.	Shelby seamless.
	Per cent.	Per cent.	Per cent.
1 inch	39	..	57½
1¼ to 2¼ inch	55	40	35
2¾ to 3½ inch	65	50	46
3½ to 4½ inch	67½	50	46
5 to 6 inch	55	..	..

Cast Iron Pipe.—A large number of cities in the middle west are considering the purchase of pipe early in the spring. The United States Cast Iron Pipe & Foundry Co. has been awarded 8,200 tons of water pipe of various sizes by the city of Portland, Ore., and 4,800 tons has been placed by the same municipality with the Oregon Iron & Steel Co., Oswego, Ore. The leading maker has also been awarded 600 tons of water pipe at San Diego, Cal. Prices are being well maintained.

We quote, f. o. b. Chicago, as follows:

Four-inch water pipe, $26.50; 6 to 12 inches, $24.50, larger sizes, $24; gas pipe, $1 a ton higher.

Old Material.—The buoyant tone which has been evident in this market during the past three weeks is still one of the features of the situation and prices on heavy melting steel, railroad wrought and other items for which there is a good demand have advanced. Steel companies continue to buy heavily on account of increased business and there is a comparative scarcity of some grades of melting steel. The Chicago & Eastern Illinois opened bids, Dec. 26, on 580 tons of various grades of old material, including 100 tons of frogs and switch points and 100 tons of No. 3 steel rails. Good prices were realized.

We quote, for delivery in consumers' yards, Chicago, as follows:

GROSS TONS.

Old car wheels	$12.50 to 13.00
Old iron rails	14.50 to 15.00
Rerolling rails (5 ft. and over)	12.75 to 13.25
Old steel rails (3 ft. and under)	10.75 to 11.25
Frogs, switches and guards	10.25 to 10.75
Heavy melting steel	10.50 to 11.00
Shoveling steel	9.50 to 10.00

NET TONS.

No. 1 R. R. wrought	$10.50 to 11.00
No. 2 R. R. wrought	9.50 to 10.00
Arch bars and transoms	13.50 to 14.00
Knuckles, couplers and springs	10.00 to 10.50
Shafting	13.00 to 13.50
Iron car axles	17.00 to 17.50
Steel car axles	15.50 to 16.00
Locomotive tires	14.00 to 15.00
Dealers' forge	8.75 to 9.25
Pipe and flues	7.00 to 7.50
No. 1 cast	10.75 to 11.25
No. 1 busheling	8.00 to 8.50
No. 2 busheling	5.75 to 6.25
No. 1 boiler cut	7.00 to 7.50
Boiler punchings	12.50 to 13.00
Cast and mixed borings	5.00 to 5.50
Machine shop turnings	5.75 to 6.25
Railroad malleable	10.00 to 10.50
Agricultural malleable	9.25 to 9.75
Angle bars, splices, etc., iron	12.50 to 13.00
Angle bars, steel	9.50 to 10.00
Stove plate and light cast scrap	9.25 to 9.75

Inquiry for Basic—Finished Material Prices Maintained.

Office of THE IRON TRADE REVIEW, Penton Bldg., Dec. 27.

Iron Ore.—Iron ore sellers are not making any attempt to negotiate sales for next year and they believe it would be folly to do so until it is definitely known whether the improvement in pig iron and finished materials is to continue. If favorable conditions improve, some furnaces may find it necessary to buy additional tonnages to meet their requirements up to the time when new ore will be available, but there is no probability that such buying will be heavy.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—The selling in this immediate district has not been heavy, but Cleveland sales agencies having furnaces in other states report a continuation of sales at a favorable rate, with little, if any, change in prices. One agency which broke its record for the year by its November sales will have a still better record for December. An inquiry for from 2,000 to 3,000 tons of basic per month for delivery through the first half of the new year is pending and it is believed the demand comes from large interests. Sellers are, however, firmer in their ideas and are not disposed to sell at recent quotations. We quote, delivered in Cleveland, for prompt delivery and the first half of next year, as follows:

No. 1 foundry	$13.75
No. 2 foundry	13.25
No. 2 southern	14.35
Gray forge	12.50
Bessemer	15.15
Lake Superior charcoal	16.50
Jackson Co. 8 per cent silvery	17.05

Coke.—The coke market is somewhat firmer, but prices show little change. No contracts of importance have been made during the week. We quote:

Connel'sville furnace coke, $1.65 to $1.75 for prompt delivery, and $1.65 to $1.75 on contract; Connellsville foundry coke, $1.90 to $2 for prompt, and $2.00 to $2.35 on contract.

Finished Materials.—As is usual at the holiday period, buying is not brisk but specifications have been coming in at a satisfactory rate and prices are being well maintained. Cases where concessions are reported are almost invariably found to be due to a "hang over" of negotiations pending before recent advances were announced. On steel bars, 1.15c, Pittsburgh, for delivery up to April 1, and 1.20c for delivery during the second quarter, except in a very few cases where quotations were made several weeks ago, are the quotations. In plates and shapes, 1.20c, Pittsburgh, for delivery up to April 1, is the general quotation, and some companies will contract up to July 1 at that price. Sheet prices are being well maintained, but the volume of new business is not large. Nuts and bolts show improvement in demand, with prices firmer. The iron mills have been running very irregularly of late.

Old Material.—The market continues quiet but considerable cheerful-

ness is shown by both dealers and brokers in expectation of better business developing after the opening of the year. Local users of heavy melting steel are fairly well supplied and rolling mills are not buying freely, but they are taking whatever stock is being delivered on contract. We quote, gross tons, f. o. b. Cleveland, as follows:

Old steel rails (under 6 ft.)	$12.00 to 12.25
Old steel rails (over 6 ft.)	12.25 to 12.75
Relaying rails	20.00 to 21.00
Old car wheels	12.00 to 12.50
Old steel boiler plate	10.00 to 10.50
Malleable iron (railroad)	11.50 to 12.00
Steel axles	18.00 to 18.50
Axle turnings	8.50 to 9.50
Malleable iron (agricultural)	10.75 to 11.25
Heavy steel	11.00 to 11.50
Country mixed steel	9.50 to 10.00
Bundled sheet scrap	8.50 to 9.00

We quote, net tons, as follows:

No. 1 R. R. wrought	$11.00 to 11.50
No. 1 busheling	9.50 to 10.00
No. 1 machine cast	11.00 to 11.50
No. 1 dealers' wrought	10.00 to 10.50
Machine shop turnings	7.00 to 7.25
Pipes and flues	9.00 to 9.50
Wrought drillings	7.00 to 7.25
Stove plate	9.00 to 9.50
Cast borings	6.50 to 7.00
Wrought iron piling plate	15.50 to 16.00
Wrought iron arch bars	15.50 to 16.00

CINCINNATI

Fair Inquiry for Pig Iron in Spite of Holiday Season.

Office of THE IRON TRADE REVIEW,
808 Provident Bank Bldg., Dec. 26.

Pig Iron.—Holiday sentiment has tinged the market to some extent, but the past week has scarcely been as dull as is generally the case. Selling agencies have been figuring on considerable tonnage and sales in the aggregate have totaled well. It is expected that the market will receive further stimulation after the first of the year, by a number of railroads placing orders for steel rails. Shipments on contract are being hurried forward, and requests to anticipate delivery are frequent. Prices are apparently being well sustained, and there has been nothing to indicate that these have been shaded. Southern furnaces are for the most part quoting on a $10.00, Birmingham, basis for prompt shipment, with first and second quarter business, at 25 and 50 cents above. It is very probable, however, that $10.00 represents the market, for any delivery up to July 1 next. Northern prices have not been changed, $13.00, Ironton, apparently being firmly adhered to. A Central Ohio melter wants 5,000 tons divided between northern and southern, analysis foundry grades. A consumer in the central part of the state is figuring on 500 tons of No. 2 and 1,200 tons of No. 3 for first half delivery, which may mean either northern or southern. It is probable that this contract will be closed tomorrow. A melter in eastern New York is asking prices on 500 tons of southern No. 2 soft for first and second quarter delivery. A malleable concern in northern Ohio wants 500 malleable, and a local consumer is figuring on 500 or 600 tons of foundry grades. A sale of 1,600 tons of Virginia iron went to a Michigan melter, also 500 tons of high silicon. A Wisconsin concern bought 600 tons of No. 1 soft and 600 tons of No. 2 foundry, while numerous smaller sales aggregating fair tonnage found their way to furnace order books. We quote at Cincinnati based on freight rate of $3.25 from Birmingham, and $1.20, Ironton, as follows:

Southern foundry No. 2	$13.25
Southern foundry No. 3	13.00
Southern foundry No. 4	12.75
Southern gray forge	12.50
Mottled	12.50
Southern No. 1 soft	15.20
Southern No. 2 soft	14.70
Standard southern car wheel	25.50
Northern No. 2 foundry	14.20
Northern No. 3 foundry	13.70
Northern No. 4 foundry	13.20
Jackson county 8 per cent silicon	16.95

Coke.—Several inquiries for furnace coke are now pending, particularly from the east. Prices are strong and the market has stiffened perceptibly. Demand is good, and consumers are anxious to receive shipments promptly. We quote from the leading coke producing districts as follows:

	Prompt shipment.	Contract second half.
Connellsville district:		
Foundry coke	$2.00 to 2.25	$2.00 to 2.40
Furnace coke	1.70 to 1.75	1.75 to 1.90
Wise county district:		
Foundry coke	2.00 to 2.25	2.00 to 2.25
Furnace coke	1.75 to 2.00	*Sliding scale basis.
Pocahontas district:		
Foundry coke	2.00 to 2.10	2.00 to 2.10
Furnace coke	1.65 to 1.75	1.70 to 1.90
New river:		
Foundry coke	2.50 to 3.15	2.60 to 3.25
Furnace coke	2.10 to 2.15	2.10 to 2.20

*Sliding scale basis means $1.60 for coke based on $9, Birmingham, for pig iron, with an advance of 16⅔ per cent of the amount over $9 at which pig iron is quoted. This is the usual basis. Other forms of sliding contracts are also made.

Finished Material.—Steel bars are quotable at 1.15c and plates and shapes at 1.20c, Pittsburgh. Structural demand is said to be small in volume, but prices are firm. Mills are being hurried, and are behind in orders. This is perhaps due to a desire on the part of consumers to get in before prices are advanced further.

Old Material.—Demand has been very quiet during the past week, and the entire list has felt the effects of the holiday season. Receipts have been about normal, but aside from the regular daily shipments, little has been done. Prices are said to be practically unchanged, yet no doubt have been susceptible to some fluctuation. According to dealers, they are as follows:

GROSS TONS.

Old iron rails	$12.00 to 13.00
Old steel rerolling	11.00 to 11.50
Old iron axles	18.00 to 18.50
Steel melting scrap	9.50 to 10.50
Car wheels	10.50 to 11.00

NET TONS.

Old No. 1 R. R. wrought	$10.50 to 11.50
No. 1 machinery	10.00 to 10.50
No. 1 busheling	8.00 to 9.00
Stove plate	6.50 to 7.00
Machine shop turnings	5.50 to 6.00
Cast borings	4.50 to 5.00
Grate bars	6.00 to 7.00
Sheet iron bundled	6.50 to 7.50
No. 1 cast scrap	10.00 to 10.50
Heavy turnings	6.00 to 7.00

ST. LOUIS

Some Fair Pig Iron Inquiry is in the Market.

Dec. 25.

Pig Iron.—About the most important item pending in the pig iron situation in the St. Louis territory is an inquiry for 2,000 tons of malleable, which will be closed soon. Another inquiry for 500 tons of Lake Superior charcoal car-wheel iron is still in the market, one for 300 tons of coke car-wheel iron, and still another for 1,500 to 2,000 tons of southern iron. Very little buying was done last week, but prices are stiffening. While $10 is still quoted for southern No. 2, Birmingham, some furnaces are holding out for $10.50. Northern iron remains firm at $13 to $13.50, Ironton. Prices delivered, to which the Birmingham freight of $3.75 has been added, follow:

Southern No. 1	$14.25
Southern No. 2	13.75
Southern No. 3	13.25
Southern No. 4	12.75

Coke.—The volume of transactions in coke have been at a very low ebb for the last week, and no new business is in sight today. Prices are inclined to stiffen, but for the present we quote as follows:

We quote 72-hour Connellsville foundry grades, $1.90 to $2.40 for whole of 1911; 72-hour foundry, $1.90 to $2.15 on tracks and for immediate delivery; 48-hour Connellsville furnace, $1.40 to $1.50; best 72-hour Virginia foundry, $2 to $2.25; 48-hour Virginia furnace, $1.60 to $1.85. The freight to East St. Louis and St. Louis is $2.80, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Old Material.—Transactions in scrap iron continue dull, with some tend-

ency toward improvement. Quotations remain as follows:

GROSS TONS.

Old car wheels	$13.00 to 13.50
Old iron rails	14.00 to 14.50
Re-rolling rails (5 feet and over)	12.00 to 12.50
Old steel rails (3 feet and under)	10.75 to 11.25
Light section relayers (45 lb. and under) subject to inspec..	20.00 to 21.00
Re-laying rails, subject to inspec.	23.50 to 24.00
Frogs, switches and guards	10.00 to 10.50
Heavy melting steel	10.50 to 11.00
Shoveling steel	10.00 to 10.50

NET TONS.

No. 1 railroad wrought	$10.50 to 11.00
No. 2 railroad wrought	9.50 to 10.00
Arch bars and transoms	13.00 to 13.50
Knuckles, couplers and springs.	9.00 to 9.50
Shafting	13.00 to 13.50
Iron car axles	17.00 to 17.50
Steel car axles	15.00 to 15.50
Locomotive tires	14.00 to 14.50
No. 1 country wrought	8.75 to 9.00
Pipe and flues	7.50 to 8.00
Tank iron and cut boilers	7.00 to 7.25
No. 1 cut busheling	8.50 to 8.75
No. 2 cut busheling	6.00 to 6.25
Cast and mixed borings	5.25 to 5.50
Machine shop turnings	6.25 to 6.50
Railroad malleable	9.50 to 10.00
Agricultural, malleable	8.50 to 9.00
Stove plates	8.75 to 9.25
Angle splice bars (iron)	10.50 to 11.00
Angle splice bars (steel)	9.25 to 9.50

NEW YORK

First Sales of Ore for Next Year—Holiday Dullness in Market.

Office of THE IRON TRADE REVIEW,
1115 West St. Bldg., Dec. 26.

Iron Ore.—Several sales of eastern domestic ore for delivery over 1912 have been made to eastern blast furnace interests and other transactions of a similar character have been tentatively concluded. The aggregate of these sales will be about 150,000 tons. The prices made have not been announced. Production in the Port Henry ore district in the Adirondack mountains in 1911 will be about 775,000 tons, compared with approximately 1,000,000 tons in 1910. Shipments, however, were proportionately heavier, reaching about 725,000 tons, compared with about 875,000 tons in 1910 or about 85 per cent of the prevous year. The heavier shipments with relation to the tonnages mined, are due to some movement in the year of ore from docks.

Pig Iron.—The usual holiday quietness has fallen upon the market and to a considerable extent has checked both new inquiry and buying. As Jan. 1 will be the expiration period for many contracts, there is nevertheless, a fair amount of covering for first quarter and first half requirements. The American Locomotive Co., which has been quietly buying for its several plants at Schenectady, Dunkirk, Richmond and Pittsburgh, as previously reported, completed its purchases in the week and these call for an aggregate of 10,000 to 15,000 tons of foundry and basic for first half delivery. The basic tonnage included for the Pittsburgh plant was small. This business was divided among Buffalo, New York state and Virginia makers, or to those plants located nearby to the delivery points. The American Steel & Wire Co. has bought 3,000 tons of low phosphorus iron from the New York state maker for first half shipment at Worcester, Mass., and the General Electric Co. has taken 2,000 tons of low phosphorus iron from a Lebanon district maker. The quoted price on Lebanon low phosphorus iron continues about $16, furnace. A Connecticut buyer took 1,000 tons of No. 2X for first half from a New York state maker at $15.25, delivered, and 1,000 tons of central Pennsylvania iron at $15.50, delivered. Other sales include 1,000 tons of No. 2X to another Connecticut foundry and 1,000 tons of No. 3 for second quarter to an up-state rolling mill at $13.25, Buffalo. A sanitary ware manufacturer is now understood to have partially closed against an outstanding inquiry for 2,000 tons of foundry iron for Norwich, Conn. The International Steam Pump Co. has put out an additional inquiry for about 2,000 tons of assorted foundry grades for shipment to Harrison, N. J., up to July 1. The price situation fails to show any noticeable improvement. In New England, sales are still being made at $15.25, delivered, for No. 2X, which is being quoted chiefly by New York state furnaces with freight advantages. Other makers are quoting $15.50 to $15.75, delivered, and a few small sales have been made at $15.95, delivered, or $13.50, Buffalo. The Buffalo market is quotable at $13.25 to $13.50, furnace, for No. 2X. The general quotation for No. 2X at tidewater in this district is $14.70, though this price is frequently shaded and down to $14.50, delivered, has been done in some cases. We quote, gross tons, for prompt and first quarter shipment at New York tidewater, as follows:

Northern foundry No. 1	$14.75 to 15.00
No. 2X foundry	14.50 to 14.70
No. 2 plain	14.25 to 14.50
No. 2 Virginia	**15.05 to 15.30**
No. 2 southern foundry	14.50 to 15.00
Malleable	**15.00 to 15.25**
Gray forge	**14.25 to 14.50**

Ferro-Alloys.—The United States Steel Corporation, which has been in the market for 6,000 tons of 50 per cent ferro-silicon for 1912 shipment, has decided not to contract at present prices and will fill its needs by periodical buying. Makers generally quoted around $68, Pittsburgh, on this business, or an adance of $15 over last year's contract of this consumer. A few carload sales of ferro-manganese at the new price of $41, delivered, have been made, but no large inquiries have come out to test this level. Present inquiry is small. We quote 80 per cent ferro-manganese at from $38.50 to $41, Baltimore, and 50 per cent ferro-silicon at from $68 to $70, Pittsburgh or Philadelphia.

Cast Iron Pipe.—Some good sized lots of cast iron pipe continue to be placed in the eastern district. The Brooklyn Union Gas Co. has distributed 3,600 tons, part of which was taken by the Warren Foundry & Machine Co. The Boston Gas Co. has placed 5,000 tons with the Standard Cast Iron Pipe & Foundry Co., which has also taken 700 tons for New Bedford, Mass. The purchase of an additional lot of flexible joint pipe is about to be made by New York city authorities. Nothing has been heard by domestic makers of the 18,000 tons for Quebec, bids for which were entered the past week. It is generally believed that this business will go to English foundries. A considerable tonnage of pipe for private buyers is still under negotiation. We quote 6-inch pipe at from $22 to $23, f. o. b. New York, in carload lots.

Finished Material.—Though the usual seasonable quietness is reflected in the decreased volume of new buying, there continues a strong undertone to conditions that is based upon the security of well-filled order books on the part of the mills. Some of the larger mills, particularly the plants of the Steel Corporation, will run unusually heavy during the holiday week and shut-downs of steel works and blast furnaces will be confined to very few plants, which indicates the heavy demands being made upon the producing capacity of the leading interest. Among the eastern plants, however, the holiday cessations will not be so restricted, since these plants are still in a much less favorable position than the Steel Corporation as to orders on the books.

Prices continue to show firmness all along the line in view of the backlogs accumulated by the larger producers. Shading, however, has not yet entirely disappeared. In structural material, the low prices recently named have brought to the front a good many sizeable projects in the New York and eastern markets. Many of these are still pending, but awards are coming more slowly since recent advances in plain material and it is seriously questioned by representative fabricators whether active building conditions will continue in an advancing steel market.

Awards in inquiries of the railroads

recently show some increase which may be attributable in part to the taking up of the consideration of requirements with the approach of the new year. The American Bridge Co. has 1,300 tons of bridge work for the Boston, Rochester & Pittsburgh; the Wisconsin Bridge & Iron Works, 1,400 tons for the Grand Trunk at Bay City, Mich.; the Virginia Bridge & Iron Works, 350 tons, for the Southern railway; the Phoenix Bridge Works, 200 tons for the Pennsylvania railroad at Newark, N. J. The Delaware, Lackawanna & Western inquiry, now out for 1912 requirements, will not exceed 5,000 tons, most of which will go to Buffalo terminal work. The Southern New England railroad, a new line building to Providence, R. I., and affiliated with the Grand Trunk system, is in the market for its bridge requirements, which are roughly estimated at about 6,000 tons. The Michigan Central railroad has plans out for a union station and terminal improvements at Detroit to require 5,000 to 10,000 tons. The McClintic-Marshall Construction Co. is now officially credited with having taken the Baldwin Locomotive Works extensions at Eddystone, Pa., 3,500 tons, as previously reported. Other awards include 1,000 tons to the Philadelphia Steel & Wire Co. for the Dock street pier, Philadelphia, 800 tons, to the Cambria Steel Co. for the additions to the Detroit Edison Co., Detroit; 1,100 tons to the New England Structural Co. for the Gilchrist building, Boston. Present bids have been rejected for the Allyn House, Hartford, Conn., 1,500 tons, and new plans will be submitted. Bids have gone in on several additional loft buildings, this city, including those for Bing & Bing, Twentieth street and Broadway, 3,500 tons, and for the Building & Engineering Co., West Twenty-fifth street, 1,000 tons. A number of other loft and office buildings continue pending in this city. It is reported that the construction of the large loft building on the Madison Square Garden site may be delayed through difficulty in financing.

The Pennsylvania lines west in the week put out their formal inquiry for cars, calling for 1,000 hoppers, 1,000 coke and 1,000 to 5,000 box cars or regular types. These numbers will probably be increased on final action. The formal inquiry of the lines east recently put out, as reported, is for 3,000 to 6,000 cars, on which alternate bids on 50 and 70-ton trucks have been asked. The Illinois Central has placed 500 box cars with the American Car & Foundry Co. and the New York Central 157 steel coaches with the same builder. The Delaware, Lackawanna & Western is still inquiring for 200 hoppers and 350 refrigerators, and the Elgin, Joliet & Eastern, a Steel Corporation road, for about 1,000 cars of gondola type. Other Steel Corporation roads may shortly buy cars. We quote, delivered at New York tidewater, as follows:

Plain structural shapes, 1.31c to 1.36c; tank plates, 1.31c to 1.36c; steel bars, 1.31c; common iron bars, 1.30c to 1.35c; plates and shapes from store, 1.70c to 1.80c. Extras shown under Pittsburgh report.

Rails and Track Material.—The Soo Line has ordered 18,000 tons of rails from the Illinois Steel Co. This order brings rail sales closed for next year's delivery to a total of about 300,000 tons. The Pennsylvania Steel Co. has taken 6,000 tons of girder rails from Stone & Webster, Boston. The National Railways of Mexico have placed 4,500 tons additional with the Maryland Steel Co.

Old Material.—Though the week has been a comparatively quiet one for holiday reasons, the market is restless and there continues considerable talk of higher prices. Some sales of heavy steel have been made at higher than $12.50, delivered, but this price represents the usual offer of consumers, and some sales at $12.25, delivered, are reported. Machinery cast is quotable at about $13 and heavy cast around $12.50, delivered, though some recent sales have been made below this figure. We quote, gross tons, prices New York dealers will pay at tidewater, with the exception of cast scrap, which has a local demand, as follows:

Old car wheels	$10.00 to 10.25
Old iron axles	18.25 to 18.75
Old steel shafting	13.50 to 14.00
No. 1 heavy melting steel	10.00 to 10.25
No. 1 R. R. wrought	12.00 to 12.50
Iron track scrap	11.25 to 11.75
Wrought pipe	9.25 to 9.50
Cast borings	5.75 to 6.25
Machinery cast	12.75 to 13.00
No. 1 heavy cast	12.25 to 12.50
Machine shop turnings	6.00 to 6.50
Railroad malleable	9.25 to 9.75
Stove plate	7.50 to 7.75
Grate bars	6.50 to 6.75

Freight rates on scrap per ton to Steelton, Pa., Columbia, Pa., Pottsville, Pa., and Harrisburg, Pa., are $1.50 from Jersey City and $2.00 from New York; to Coatesville, Pa., Ivy Rock, Pa., Phoenixville, Pa., and Reading, Pa., $1.50 from Jersey City and $1.80 from New York; to Bethlehem, Pa., $1.10 from Jersey City and $1.60 from New York; to Roebling, N. J., $1.00 from Jersey City and $1.50 from New York; to Milton, Pa., $1.60 from Jersey City, and $2.00 from New York.

The Chicago, St. Paul, Minneapolis & Omaha Railroad has placed five six-wheel switching locomotives with the American Locomotive Co. The Pacific Mills, Lawrence, Mass., has bought one four-wheel saddle tank locomotive of the same builder.

BUFFALO

Fair Tonnage of Pig Iron Sold—Structural Contract Awarded.

Dec. 26.

Pig Iron.—The customary holiday quietness was noticeable in the week's business. The volume for the week is estimated at 20,000 tons in foundry, malleable and other grades. One of the interests disposed of about 8,000 tons. The inquiries have not been as brisk as for previous weeks, and the whole situation appears to be taking on an atmosphere of quietness, compared with the activity of the early part of the month. This is an annual condition looked forward to by the sellers. Shipments are going forward at a satisfactory rate, being up to the capacity of most of the furnaces. The call in some directions is very urgent where the metal is required for manufacturing purposes.

The following prices substantially represent the market here, f. o. b. furnace:

No. 1X foundry	$13.50 to 13.75
No. 2X foundry	13.25 to 13.50
No. 2 plain	13.25 to 13.50
No. 3 foundry	13.00 to 13.25
Gray forge	13.00
Malleable	13.50 to 14.00
Basic	14.00 to 14.25
Charcoal	16.00 to 17.25

Finished Material.—The work on the part of jobbers and a number of the dealers in clearing up inventories and the holiday season has had its effect on the market, producing a moderate quietness in some lines. The specifications coming in have been quite good for bars, plates and shapes. There has been no change in the prices during the week; the minimum quotations of last week being the prevailing base on this week's contracts. The indications for the coming year are promising. There are a number of jobs in sight which are now in the hands of the architects.

In the wire nail and wire products lines, both the Steel Corporation and the independents have been doing a business of remarkably large tonnage for this season of the year. It is reported that orders have been coming in right up to the edge of the inventory period, with an apparent stiffening in prices and the mills are said to have contracted for first quarter and first half business, up to 75 per cent of their capacity. The tendency is toward a further raise in prices on wire nails and wire products.

On the new Bancroft hotel, Worcester, Mass., requiring 1,200 tons of

structural material, bids were asked on a ton base. Four of the ten bidders who submitted estimates put in the same figure. The contract went to the New England Structural Steel Co., of Worcester.

Old Material.—The market still continues to hold to the advances made in the past few weeks. The amount of trading in the aggregate has amounted to a considerable tonnage, although modified because of the holidays and inventory period. A number of purchases from outside the district have been made and the same cautious buying to stave off further advances has been noticeable. Although there has been no material change in prices, the market has stiffened. We quote the following gross ton prices, f. o. b. Buffalo, for the week, substantially as follows:

Heavy melting steel	$13.00 to 13.25
No. 1 railroad wrought scrap	14.00 to 14.50
No. 1 R. R. and mch. cast scrap	13.75 to 14.00
Old steel axles	18.75 to 19.00
Iron axles	22.00 to 22.50
Car wheels	12.75 to 13.00
Railroad malleable, scrap	12.75 to 13.25
Wrought iron and soft steel turn.	7.50 to 7.75
Cast iron borings	6.75 to 7.00
Low phosphorus steel scrap	15.75 to 16.25
Old iron rails	15.00 to 15.50
Tank iron	10.00 to 10.50
Boiler plate, sheared	14.00 to 14.25
Pipe and tank	10.00 to 10.50
Stove plate	9.75 to 10.25
Sheet iron	7.00 to 7.50
Locomotive grate bars	11.00 to 11.25

BIRMINGHAM

Stocks are Low and a Normal Rate of Consumption is Expected.

Birmingham, Ala., Dec. 26.

Pig Iron.—The local market is, just at this particular time, very quiet, with but few transactions recorded during the past week. A reduction in the rate of shipments from furnace yards has been noted, but in no case has the tonnage held up exceeded expectations. A canvass of the leading melters confirms the theory that stocks on such yards are comparatively small, and the authorities most conversant with conditions predict a normal rate of consumption immediately after inventories have been taken and results of the fiscal year's operations are known. Recent sales have involved such quantities as not to afford an accurate test of the strength of quotations, but it is believed that the status of prices is unchanged. A lot of 5,000 tons of No. 2 soft for shipment over the first half has been before the selling agent for weeks at lower prices than a $10, Birmingham, basis, and the same can be said of one or more round lots of No. 3 foundry offered at $9.25 per ton. The demand for low grades continues very strong and records show that the production of such grades during the past four months has been smaller than that of a similar period for several years past. This applies to No. 4 foundry, gray forge and mottled, while there is practically no accumulation of silvery, or high silicon iron, and No. 1 foundry is very scarce. Certain of the producing interests still remain practically out of the market for advanced deliveries and others adhere strictly to a basis of $10.50 per ton at Birmingham. There is sufficient tonnage available at $10, Birmingham, to meet the present demand, even for shipment over the first half, but by reason of the preference in brands some iron has been sold for the first half at $10.25 per ton at Birmingham. Complaints of the narrow margins afforded in the production of certain castings are more frequent, and to some extent have affected the buying, especially by the small founders. There is, however, still a considerable tonnage on producers' books that was engaged at higher prices than now rule, which is being delivered and, of course, is going into the foundry mixture. We continue to quote the market for foundry iron as per the schedule below, f. o. b. cars at Birmingham district furnaces, with standard basic iron quotable at figures very close to those asked for No. 2 foundry:

No. 1 foundry and No. 1 soft	$10.50
No. 2 foundry and No. 2 soft	10.00
No. 3 foundry	9.50
No. 4 foundry and forge	9.25
Basic	10.00

Cast Iron Pipe.—Southern producing plants will furnish a considerable portion of the requirement of some 12,000 tons of water pipe for Portland, Ore., but aside from this, recent sales are small in the aggregate. Just at this time, the plants are closed down for inventories, but operations will be resumed immediately after the holidays and it is presumed to the same extent as formerly. Some inquiry is being received covering small lots for maintenance purposes and one or more southern municipalities are considering the extension of water works and gas systems. There is also to be installed at an early date a water works system complete, and for which provision has not yet been made. We quote the market as steady, with the following prices prevailing, per net ton, f. o. b. cars here, viz.: 4 to 6-inch, $22.50 to $23; 8 to 12-inch, $21.50 to $22; over 12 inches, average $20.50. Gas pipe, $1 per ton higher.

Old Material.—This is still largely a dealers' market, but the consuming interests are manifesting more interest and have within the week purchased several "bargain" lots. The status of price can hardly be arrived at with accuracy, but a revision on certain grades is considered warranted, while all quotations are no doubt firmer than at the time of last report. As to just what extent the accumulation will be increased by reason of the "clean-up" at foundry and furnace plants with the taking of inventories, a statement cannot be made, but it is understood that some attractive tonnages of wrought and steel scrap will be offered for prompt movement. We revise dealers' asking prices as follows, per gross ton, f. o. b. cars here, viz:

Old iron axles (light)	$12.50
Old steel axles (light)	12.00
Old iron rails	11.50
No. 1 R. R. wrought	10.00
No. 2 R. R. wrought	9.50
No. 1 country	6.50
No. 2 country	6.00
No. 1 machinery	9.00
No. 1 steel	8.50
Tram car wheels	8.50
Standard car wheels	10.00
Light cast and stove plate	6.50

BRITISH IRON MARKET

Better Pig Iron Week in Year—Steel Getting Scarce.

Office of THE IRON TRADE REVIEW, Prince's Chambers, Corporation St., Birmingham, Eng., Dec. 16.

Pig Iron.—This is the best week that pig iron has experienced this year, and prices are rising rapidly. They have increased half a crown since the middle of November, and the upward movement goes on daily. Yesterday's quotation was 49s 8d ($12.16) for warrants at Cleveland, 50s ($12.24) one month, and 50s 7d ($12.38) three months. The rise is so rapid that some buyers are holding off in the belief that it is too rapid, but even they have to admit that all circumstances point in the direction of continued improvement. The better advices from America have furnished just the one stimulating tonic which was necessary. Shipments have progressed considerably. The pig iron exports from Cleveland this month have been 67,000 tons, compared with 42,000 for the first half of November. Stocks continue to decrease rapidly, being now 58,000 tons from the recent maximum, the decrease this month being 13,100 tons. The rapid increase has taken traders somewhat by surprise, but many shrewd observers consider that the real cause of surprise was the low

figure at which pig iron remained when a very heavy consumption was in progress in the autumn.

Finished Material. — The finished iron and steel market shows increasing buoyancy, with plenty of orders in all departments. In the steel trade, there has been an enormous rush of buying, and, in some instances, the bookings have been unprecedented. For example, one steel works alone has booked from 50,000 to 60,000 tons of shipbuilding material. During this week, the shipbuilders have added 50,000 tons to their order books, and there are more ships on offer, with freights at an improving level. Practically, all the Scotch steel works are running mills to their outside capacity. The railways are now very large buyers. It is assumed that 80,000 tons of steel rails wanted for South Africa will go to British works. In Sheffield, all the steel makers are very busy. Makers of railway material are booked for three or four months next year, even without another order. Armament departments are extremely busy. In the tool steel department the works are well employed, although American buying is not at all up to its usual level. In the constructional department, there is a marked improvement, largely owing to works extensions in many industries. In the steel trade, it is considered certain that an advance in the prices of finished steel will be declared within the next week. On the whole, their steadiness for several months past has been a matter for surprise.

METAL MARKETS

St. Louis

Dec. 25.

Lead and Zinc.—The top price for zinc blende in the Missouri-Kansas-Oklahoma district last week was $47 a ton on an assay base of $44 for 60 per cent grades, with prices for carload lots ranging down to $40 a ton. Smaller lots brought a still less figure. Shipments were fairly good and the surplus was not increased. About 5,000 of the 10,000 tons surplus has been sold and is awaiting shipment. Bidding is expected to be stronger this week because of the strength manifested in the metal market at the close of last week. Calamine brought a top price of $30 a ton on an assay base of $25 for 40 per cent grades, ranging down to $22 a ton. Lead ore was strong at the close of the week, central camps realizing a price of $60 to $64 a ton, with outlying camps reporting offerings as low as $50 a ton.

Chicago

Chicago, Dec. 23.

New Metals. — Copper continues firm and has advanced in sympathy with conditions in the east. Spelter seems to now be on the down-grade, having declined $1 a ton during the past week. The price of lead is being well maintained and tin is practically stationary.

We quote, dealers' selling prices, f. o. b. Chicago, as follows:

Lake copper, carload lots, 14½c; casting, 14c, smaller lots, ¼c to ¾c higher. Spelter, car lots, 6.15c; lead, desilverized, 4.40c to 4.45c in 50-ton lots; corroding, 25c per 100 pounds higher; sheet zinc, $8.25 list, f. o. b. La Salle, in car lots of 600-pound casks; pig tin, 45½c. Cookson's antimony, 9¼c; other grades, 8¼c to 8¾c.

Old Metals.—Copper and brass are firm in sympathy with conditions existing in the new metal market. Buying is fair and some consumers are inclined to anticipate their requirements slightly.

We quote, f. o. b. Chicago, as follows:

Copper wire, crucible shapes, 13½c; copper bottoms, 11c; heavy cut crucible copper, 11½c; heavy red brass, 12c; heavy yellow brass, 8¾c; No. 1 red brass borings, 9½c; No. 1 yellow brass borings, 8¼c; brass clippings, 8½c; lead pipe, 5c; zinc scrap, 5.50c; scrap aluminum, 12c; tea lead, 3¾c; No. 1 pewter, 28c; block tin pipe, 37c; tin foil, 35c; linotype dross, 3¼c; electrotype dross, 3c; stereotype plates, 4½c; stereotype dross, 3¼c; prime slab zinc dross, $88 to $90 a ton.

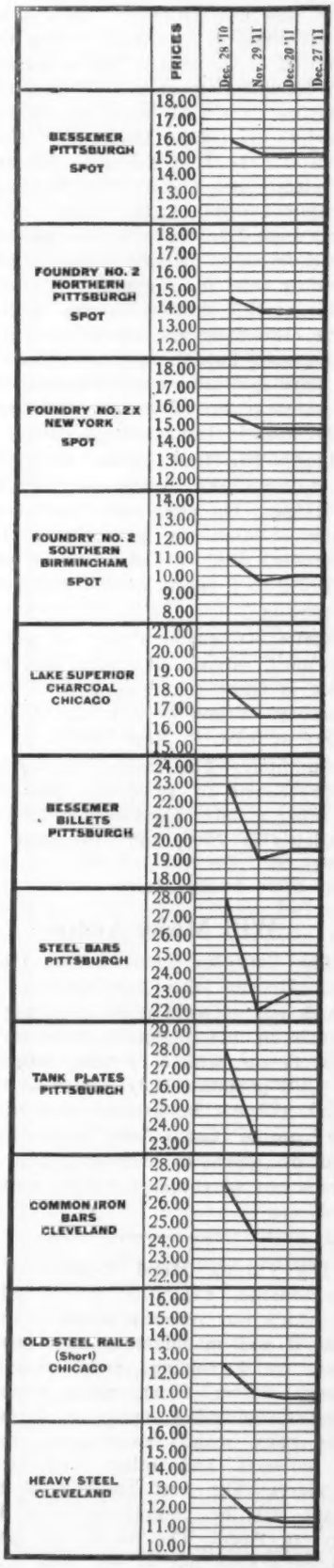
New York

Dec. 26.

Tin.—The foreign market has been closed since the middle of last week, and very few sellers, or buyers, have been willing to undertake business under the circumstances. A few sales have been made at from 44.75c to 45c for spot and December. The trade is not expecting any important business until after the end of the year. Then, it seems probable, consumers will have to take liberal amounts to provide for the large consumption that is expected to prevail next year, as stocks at manufacturing plants are known to be light.

Arrivals since Dec. 1 aggregate 3,488 tons and there are 1,995 tons afloat. It is thought that deliveries

PRICE CHART



in December will be about 3,800 tons, which will leave approximately 400 tons to be added to stocks.

Copper.—A large volume of business has unquestionably been done with consumers of copper during the last half of the month, but a seasonable let-up has taken place during the past few days. All important selling interests are asking 14.25c cash, New York, and 14.37½c, delivered 30 days for electrolytic, and 14.37½c for lake. Casting is from 14c to 14.12½c. Exports since Dec. 1 are 28,676 tons, and are expected to increase to the largest monthly total for the year. There is a lot of talk concerning the speculative element in the recent price improvement, but at the same time it is quite generally conceded that the backbone of the advance is actual improvement in the business outlook.

Lead.—The lead market continues quiet, with the American Smelting & Refining Co. apparently the lowest seller at 4.45c, in New York. Independent producers claim to be getting 2½ to 5 points more for prompt shipments.

Spelter.—Consumers are not showing much interest in spelter and the price is down to 5 points since last Tuesday. Prime western can be had today at 6.35c, in New York.

Antimony.—The market shows no improvement in sympathy advances in other metals. Cookson's is 7.87½c, Hallett's is 7.70c, and Hungarian is 6.95c.

Will Make Autos

The Canadian Two in One Auto Co., Detroit, the incorporation of which was recently noted, will manufacture an interchangeable touring and delivery car, with a carrying capacity of 1,500 pounds. The location of the plant will not be decided until after the Toronto (Can.,) Auto Show, which will be given in February, and at which one of the cars will be exhibited.

The Florida Metal Products Co., Jacksonville, Fla., the incorporation of which was recently noted, advises that it will manufacture metal shingles, metal roofing, metal Spanish tiling, cluster tiling, metal ceiling, cornice, guttering, spouting, turpentine cups, metal fence posts, metal culverts and other such metal products. The first building of the plant will be completed about the first of April. The machinery specifications have not as yet been completed.

FOR THIRTEEN MONTHS

Employes of the Newport Mine are Paid Every Year.

In accordance with the custom established by Ferdinand Schlesinger, owner and operator of the property, the big Newport mine at Ironwood, Gogebic range, will this holiday season donate to its employes an amount equal to their regular December earnings. The Newport found it necessary to retrench last spring, in view of the slow demand for ore, nevertheless it is employing in the neighborhood of 1,000 men, so that in the aggregate a good-sized sum will be distributed in Christmas gifts this Yuletide time. By the plan of the company, the men receive 13 months' wages in the year. Naturally there is never any trouble to procure the very best and most efficient labor, which is paid the ruling scale, nor is there ever any danger of strike troubles. There was a time when, physically, the Newport was looking very poorly. The old Bonnie shaft had a small although rich deposit of manganiferous ore, but generally the future of the property appeared decidedly unpromising. The shafts were put down deeper, and the results were wonderful, the mine now having the largest showing of high grade ore in the Michigan and Wisconsin portion of the Lake Superior region. Based on only one body, there is in sight at the Newport, according to the state tax commission's appraisal, 17,000,000 tons of ore. Two other ore deposits, the extent of which is problematical, dip into the Newport lands.

Directors Approve Warwick Furnace Lease

Directors of both the Eastern Steel Co. and the Warwick Iron & Steel Co. at meetings held the past week approved the terms for the lease of the Warwick blast furnaces at Pottstown, Pa., to the former company for a period of 99 years. This action substantially consummates the transaction, but formal ratification by the stockholders of the two companies at meetings to be held in January is still awaited. The lease given to the Eastern Steel Co. covers the two furnaces and an alternate stack just completed of the Warwick Iron & Steel Co. at Pottstown, Pa., and a third furnace of the Pottstown Iron Co. at Pottstown, under lease by the Warwick company. The statement is repeated by officials of the Eastern Steel Co. that no plans are directly in view for the providing of a steel plant at Pottstown, to obtain the economies possible through the use of hot metal.

Time of Suit Extended

The United States circuit court at Trenton, N. J., has granted an extension of time from Jan. 1 to Feb. 1, to the United States Steel Corporation, in which to answer the suit brought against it by the government.

Steel for America.—There is almost as much difficulty in getting crude steel from the north of England and South Wales as from the continent, says our Birmingham, Eng., staff correspondent. Naturally, a good deal of speculation is made as to the ability of America to send billets to this country. The reply to such queries by importing merchants here is that, with the present comparatively low price of American billets good sales should be possible, if sufficiently cheap freight could be secured. It is assumed that the inability to obtain this low freight is the explanation of the non-appearance, up to the present, of American billets. British makers have been able once more to advance their prices, making Bessemer billets £5 5s and Siemens billets £5 7s 6d.

Gas Producer Contract.—The Youngstown Sheet & Tube Co. has let the contract to the Wellman-Seaver-Morgan Co., Cleveland, for 18 Hughes automatic gas producers, which will be part of the equipment of the proposed additions to the East Youngstown works.

The manufacture of light delivery trucks under patents of the Owosso Motor Co., which recently failed through lack of capital, will probably be carried on in Bay City, Mich. Interests affiliated with Eddy Bros. & Co., of that city, are reported to have purchased the Owosso patents and mechanical parts.

The Vulcan Detinning Co. has declared the regular quarterly dividend of 1¾ per cent on preferred stock, payable Jan. 20.

The Electric Wind Turbine Co., Lewiston, N. Y., advises that it will manufacture apparatus for producing electric power from wind.

RETRENCHMENT POLICY

Of Railroads Will Continue in 1912—Railway Officials Are Not Optimistic.

The Railway Age Gazette, in its issue of Dec. 29, will publish expressions from a large number of railway presidents and executive officers regarding the existing railway situation and the railway and general business outlook for 1912.

While most of the railway officers quoted seem to believe that business in general, and the railway business in particular, will be better in 1912 than it was in 1911, and that the railroads will spend more money, they are not optimistic over the outlook.

President Frederick D. Underwood of the Erie says: "Railways will continue to spend as little as possible on maintenance and improvements, and to refrain from additions to equipment or new construction, until they have a better market for securities."

President J. A. Edson of the Kansas City Southern says: "The general attitude of federal and state governments have tended toward rendering capital expenditures inopportune, and this condition has reduced railway earnings. Expenditures by railways will, no doubt, conform to these conditions during 1912 as in the past. The action of federal authorities and public declarations of men in political power having in the past few months indicated a tendency toward sane control of corporate interests, may restore confidence to business interests in general. The large purchases by the railways of equipment, as reported within the last 90 days, will stimulate business."

Another president, whose name is not given, says: "I think the railways are apt to spend a little more money on maintenance, improvements and additions to equipment in 1912 than in 1911, but I am doubtful about new construction. There is not much incentive for capital to go into large new railway enterprises."

C. S. Sims, second vice president of the Delaware & Hudson, says: "I am inclined to feel that the railway retrenchment will continue until the political situation has been cleaned up."

J. Ross Clark, second vice president of the San Pedro, Los Angeles & Salt Lake, says: "I regard the business outlook for 1912 in a general way as good; but, it being a presidential election year, the tendency may be to curtail some improvements."

Most of the railway men quoted express the opinion that public sentiment toward the railways is more friendly than in past years. However, President Underwood says: "I do not think there has been a change in the attitude of the public toward the railways. The portion of the public which is clamoring for the prosecution of the railways is to be differentiated from that portion who may be designated as shippers. The shipper, as I know him, has the best of feeling toward railways as a whole."

President Edson says: "The public is possibly coming to understand that a general advance in rates will be negligible in its individual effect, but the shipper is the protester, and I think is unchanged in his determination not to permit it."

The president of a western road, whose name is not given, says he has "found a very decided change in the attitude of the shipping as well as the general public toward railways. The general attitude of thinking business men is that the railways have been punished instead of regulated and that the reflex has been disastrous to general business."

Most of those quoted favor federal regulation of railway securities. President Underwood says: "I am in favor of the regulation of the issuance of railway securities by federal authority, for the reason that such regulation will bring about a better market for them."

President Edson says: "The investing public is entitled to know that the securities purchased are backed by substantial values, and I would favor federal authority insuring uniformity as against conflicting and varying regulations by the different states."

The president of one eastern road emphatically declares against such regulation. "It has always been very hard," he says, "for the railway to raise money, and the interference of commissions makes a hard matter harder."

In answer to a question as to whether he favors federal incorporation or any other means that will tend to reduce regulation by the states, President Underwood says:

"While I am not in favor of any further legislation in relation to corporations, federal is preferable to state legislation. It is perhaps time to again call attention to the present ridiculous and impossible situation—46 railway commissions and a federal commission, all seeking to regulate railway corporations."

President Edson says: "I am in favor of anything that will concentrate and simplify such regulation as may be proper, and this would seem to be possible only through national control to the entire exclusion of state authority."

J. Ross Clark, second vice president of the San Pedro, Los Angeles & Salt Lake route, says: "I strongly favor national legislation for the incorporation of corporations doing an interstate business that will have a tendency to abolish state control."

F. O. Melcher, second vice president of the Rock Island lines, says: "It is essential that the regulation of interstate carriers be concentrated in the federal government rather than subjected to the diverse views of 49 different governments. Can this be best done by means of legislation specifying federal incorporation or by other methods? I do not know but that the establishment of minimum requirements by congress of standard practices and the commitment of the Interstate Commerce Commission to these requirements would seem to accomplish the purpose."

The president of one of the southeastern lines declares emphatically in favor of "federal incorporation and responsibility of interstate railways to a federal commission only."

F. O. Melcher, second vice president of the Rock Island lines, opposes any further legislation by congress regarding railway operation. He says: "Let us defer further legislation until the present and existing laws are intelligently administered by government officers. The ability of the Interstate Commerce Commission to administer our present multitude of laws is yet to be demonstrated."

President Underwood says: "No legislation is necessary or justifiable with a view to improving the transportation service, making it safer, or more economical. Competition between lines will take care of that far better than statutes."

The Argenta Boiler & Iron Works, Little Rock, Ark., opened for business, Dec. 18. The plant is located at Arkansas and Magnolia streets, and will employ about 30 men.

The Sharon Steel Hoop Co., Sharon, Pa., declared the regular quarterly dividend of 1¾ per cent, payable Dec. 22.

RAILROAD COMPLETED

Connecting Ore Fields of Eastern Texas With Atlantic Coast Ports.

The Port Boliver Iron Ore railway into Ore City, Tex., has been completed, thereby connecting the ore lands of the eastern part of Texas with the coast. This is a big factor in the development of these lands, as it affords a means whereby the iron ore mined in that part of the state can be shipped directly to Boliver, Tex., a sea port, from where it can be taken by steamship to Atlantic coast points for reduction. In preparation for this, ore docks have been built at Boliver. It may also mean the establishment on a larger scale of the iron and steel industry in that part of Texas, for, with the aid of the new railroad, the ore from the Texas fields and coke from the Atlantic fields can be centralized at this point.

The Function of Wrought Iron

Editor of THE IRON TRADE REVIEW:

From 10 to 15 years ago, when Bessemer steel had reached its high point, and when open hearth steel was in the development stage, the claims were many and broad, that the latter would supply equal safeguard and protection, and meet every requirement as completely as was secured in the old fashioned puddled wrought iron of earlier days, and at much lower cost to manufacturer and consumer. It was decreed by leading steel makers that the age of wrought iron was past, that in a few years its manufacture would become obsolete, and that the age of steel was its advanced and improved successor. So generally was this decree accepted as gospel that consumers have attempted the impossible in their efforts to use steel for anything and everything in work for which from its very nature it is unfit, and have persisted in this use notwithstanding its unfitness, because of its lower cost, and because they have grown into the habit of regarding iron as a "back number". Many whose judgment and experience are against the use of steel for field and forge work and in many branches of shop work, and who are fully convinced of the better security and safety in a good wrought iron, halt at the somewhat higher cost of the latter, to the frequent prejudice of their work and its better final economy. Engineers, too, in the past two or three years, are not only preferring, but are requiring wrought iron in various parts of bridge and viaduct construction because of its more certain security and its much slower impairment of structure and deterioration under varying strains and outside exposure.

Iron, we recognize, could not well be supplied for the millions of tons that enter into rails, car construction, elevated and subterranean railways, office and public buildings, and other construction, and in some it is not needed,—notably rails, for which steel is unquestionably better. These are the natural and legitimate uses for steel, because of easy requirements and low cost, and they take the vast tonnage necessary for the active operation of the great mills and industrial plants. But wrought iron has just as legitimate function in the industrial economy of today as steel, and is really more important, for its proper field is where human life is exposed and put in hazard, and where the first cost of material is only a fraction of that attending a disaster.

That iron offers better security in a forging and in a perfect weld, in a boiler stay bolt or engine bolt, in switch and signal tower reverse levers, in hand and step irons on cars, in stud bolts, in crane and dredge and other special chains, in any work exposed to constant shock and vibration, is well known to experienced mechanics everywhere, and that for some of these uses steel is totally unfit, and for other uncertain and unreliable. It is a fact not generally appreciated too that more iron is being made today than some years ago, and this notwithstanding the further fact that it has been, for a decade, almost completely ignored by the engineer, metallurgist and laboratory, so far as any attempt to preserve or promote its value and individuality is concerned.

The government uses large quantities of refined wrought iron under rigid specification and in special requirement work in which it would not consider steel at all. To the railroads it is invaluable, and none of the leading lines use steel for boiler stay bolts, engine bolts and many types of forging work because of its unreliability to withstand constant shock and vibration, and extremes of temperature, as well as iron. To the chain maker it is just as necessary because it provides safety and security not found in steel.

Iron is being imported in considerable quantities from Sweden and England of no better quality than is being made by mills in this country, because of the idea that America has gone steel mad, and has quit making high grade iron. So here we are with one of the oldest industries in metallurgy, making a type of material that never was so vitally important and essential as at this time of tremendous machinery and vast enterprises operated by mechanical appliances; a business, that instead of going into oblivion, is steadily increasing in volume; a business that requires hundreds of thousands of tons to meet, and that is subject to more exacting physical tests than steel of any type and yet so utterly neglected in the educational scheme of the country, that there is not a university or technical school whose modern text book gives more than a paragraph or two to wrought iron, or that attempts to give students specific instruction or practical demonstration of how it is made or its value. Recently in a personal interview the claims for superiority of puddled iron were disputed by a champion of steel, and broader claims were declared ridiculous. Later on, when these claims were established, the disputant admitted very limited knowledge of wrought iron and its properties, as he regarded it a "has been" and his whole interest and endeavor had been given to steel. Yet this man has been for many years a consulting engineer, and a professor of metallurgy and demonstrator of physical tests of materials to advanced students in a technical school.

This is evidence that wrought iron has no recognition in the curriculum of this institution and we question if there is one in 50 of the recent graduates from technical or university metallurgical courses who would be of value in a rolling mill devoted to making puddled bar iron or could tell how it is made and refined, what its structure and characteristics as compared with steel are, what its field and particular function. And yet it is the oldest process and branch of the iron or steel industry, employs thousands of men and turns out hundreds of thousands of tons, and never in its history has there been a time when good puddled and refined iron with its security, its long endurance against shock and vibration and its better protection to human life, was more needed than in these days of high speed, tremendous types of locomotives and machinery, and when efficiency and economy are the watchword in manufacturing concerns, in boiler and engine works, machine shops and on railroad systems.

Restore good wrought iron to its proper niche, give it the recognition that is due to a valuable and necessary material, measure it solely on its merits, and it will prove that it has "come back" to stay and asks no favor other than its legitimate share of business.

CHAS. H. REID
Vice Pres. Zug Iron & Steel Co.
Pittsburgh, Dec. 27, 1911.

To Use Oil Fuel

The Canadian Pacific Railway has decided on using crude oil as fuel for its locomotives on the portion of its British Columbia division known as the Shuswap and Mountain subdivisions. Circular tanks of riveted steel boiler-plate with a capacity for 200,000 gallons each will be constructed at several points. It is stated that the only change necessary in the locomotives will be the substitution of jet burners in the fire boxes. The tenders will be changed to hold oil instead of coal.

Broke Rail Record

The output of open hearth rails (at the Pennsylvania Steel Co.'s works) this week broke the records. The rails were exceptionally fine quality and the average was close to 1,000 tons every 24 hours. On Monday H. O. Smith broke the record by turning out 553 tons in 12 hours, being the largest run since the days of Bessemer rails.—Steelton (Pa.) Reporter.

The Ornamental Iron Works, 1942 South Main street, Los Angeles, Cal., has been awarded a contract for the ornamental iron and bronze work in the new office building of the Los Angeles Investment Co., at Eighth street and Broadway, at a price of $37,100.

The Frederick Kahl Iron Co., Detroit, has been incorporated with $100,000, to succeed to the foundry and pattern shop business heretofore carried on by Frederick Kahl personally.

CARBIDE LAMPS

May Take the Place of Candles and Oil Lamps in Ore Mines.

Marquette, Mich., Dec. 26.—A miners' carbide lamp is to be given a test by the United States Steel Corporation on the Marquette iron range. Providing the new device for underground illumination is found satisfactory it is understood that it will be adopted by the company for use at all of its Lake Superior properties. The test will be made at the Section 16 mine at Ishpeming. Tallow candles and oil lamps are now in general use. These furnish very poor light, yet for want of something better they have been doing duty ever since the inception of Lake Superior mining decades ago. Important advantages are claimed for the carbide lamp. It weighs less than an oil lamp or a candlestick and candle, it produces no smoke or odor and it reduces the fire danger to the minimum. It is substantially made of brass. The carbide lamp looks much like a pepper box, except that it has a headlight about 3 inches in diameter. There are two sections, the upper one being used for water and the lower section for the carbide. The charge is sufficient to keep the lamp in commission two and one-half hours, at the end of which time the supply is renewed by changing the lower section for an extra one that the miners carry on their person. Both lower sections are recharged at the dinner hour. Properly used, the lamps will last for years. To induce good care of them, the company will charge a small price for the lamps, but one that will not represent the cost. The new device was introduced at the Republic mine of the Cambria Steel Co. a number of months ago and is said to have given satisfaction and to be very popular both with the men and the officials.

Will Double Capacity of Furnace Plant

Ironwood, Mich., Dec. 26.—Announcement is made that the Atikokan Iron Co., of Port Arthur, Ont., is to double the capacity of its furnace plant and install by-product coke ovens, with the intention of furnishing gas at a reasonable rate to the cities of Port Arthur and Fort William. The system will be identical with that of the Zenith Furnace Co., of Duluth, only not so extensive. With the alterations completed, the capacity of the stack will be approximately 200 tons of pig iron daily. The coke ovens at present operated in connection with the furnace are of the old, beehive style and the by-products are lost. Port Arthur and Fort William have a combined population of nearly 40,000 and it is believed they will furnish a market for all the gas that can be produced, especially when the product can be supplied profitably at a low figure. The ore treated at the furnace is from the company's own mine in the Atikokan range in Ontario. This property is employing 120 men and is said to produce a very satisfactory grade of ore.

Reads Paper on Use of Metal Laths

H. B. McMaster, commissioner for the Associated Metal Lath Manufacturers, read a paper recently at a meeting of the Youngstown Credit Men's Association, of Youngstown, O., which has been issued by the insurance committee, as it contains much information on fire prevention. It also gives details of a laboratory that is being maintained at Cleveland by the Associated Metal Lath Manufacturers, in which laths of different materials are tested by subjecting them to a high heat, and then drenching them with water, following the same course that would be experienced in any conflagration.

Erects New Foundry

The Worcester Pressed Steel Co., Worcester, Mass., advises that it is erecting a new foundry, 21 x 31 feet, which will require a cupola and other equipment. It will be used for producing high grade iron and steel castings for dies and die beds for the company's own use. A new office building, two stories, 50 x 100 feet, is also being erected and the space heretofore occupied by the offices will be added to the tool and die making department. The company specializes in cold seamless hollow drawing, pressing, coining, embossing, forming and stamping parts from sheet steel, brass, copper, aluminum, silver and other sheet metals.

The Western Machine Co., of Eau Claire, Wis., has commenced the manufacture of gasoline engines and motors in its plant on Water street. The product will for the present be confined to a line of 3 and 5 horsepower engines. After Jan. 1 the force will be increased and the output will be ten engines per day.

BUILDING PROJECTS

In Louisville Will Require a Large Amount of Material.

Louisville, Ky., Dec. 26.—Some large building projects are announced which will consume a large amount of structural material and equipment. Edwin H. Kaufman, of this city, is planning a 10-story stag hotel and bathhouse near Fourth and Walnut streets. An estimated expenditure of $100,000 is involved. John P. Starks is having plans completed for a 16-story office building at Fourth and Walnut streets.

The board of commissioners of Hamilton county, at Chattanooga, Tenn., are about to let contracts for the erection of a $350,000 court house building. The Holston National Bank, Knoxville, Tenn., is to let contracts for its new skyscraper, which will cost $25,000, early in January. The building will be of steel frame construction.

The Louisville & Nashville is to build a steel viaduct at Montgomery, Ala., as well as make other important improvements there.

The board of education of Louisville has awarded a contract for 1,400 metal lockers for one of the local school buildings to Merritt & Co., of Camden, N. J., who bid $6,190.

Pawling & Harnischfeger, of Milwaukee, have completed the installation of a 10-ton electric crane in the addition to the plant of the Henry Vogt Machine Co.

The Falls City Construction Co. has let a contract to the Otis Elevator Co. for the installation of three electric elevators in the 10-story building it is erecting here.

The Maysville, Ky., Public Service Co. has let a contract to the General Electric Co. for a 200 kilowatt generator.

Grand Trunk Buys Coal Lands

The Grand Trunk Railroad Co., of Canada, has purchased the holdings of the Rail & River Coal Co., Pittsburgh, which include mines in Belmont county, O., with an annual output of 800,000 tons, and 31,000 acres of the Pittsburgh No. 8 seam coal. The Rail & River Coal Co. has a capital stock of $2,500,000 and a bond issue of a like amount. The new owners will assume the bonds and pay for the stock approximately $3,500,000. W. R. Woodford, formerly first vice president of the Pittsburgh Coal Co., is president of the Rail & River Coal Co.

LARGE OUTPUT

Of Pig Iron in Pennsylvania in 1910 —Effect of Low Prices is Very Noticeable.

The annual report of John L. Rockey, chief of the bureau of industrial statistics of the department of internal affairs, which was given out Dec. 26, shows that the blast furnaces of Pennsylvania in 1910 produced 11,128,957 gross tons of pig iron, an increase of 407,934 tons over 1909, and with but two exceptions the largest production of any year in the history of the state. The two exceptions were the years 1906 and 1907, which showed totals of respectively 11,244,292 and 11,311,985 tons. Owing to the lower prices, however, the value of the 1910 output was only $179,629,535, compared with $186,963,824 for the smaller tonnage of 1909. The aggregate of wages for 1910 was $1,734,195 higher than in 1909. Allegheny county produced 48.3 per cent of the total output of the state, against 51.3 per cent in 1909.

Good December Record for Sales

Pittsburgh, Dec. 27. (By wire.)—A local steel company that recently closed for round tonnage of basic pig iron has taken upward of 2,000 tons of special analysis foundry iron for shipment early in the new year, the price paid being slightly above the usual market level. Purchases made by merchant furnaces show that buying of pig iron for December exceeded that of any of the preceding six months of the year. The majority of the larger buyers are now under contract for requirements after the first quarter. Despite the heavy buying, prices have not been advanced to any extent.

Steel Plant Resumes

Baltimore, Md., Dec. 27. (By wire.) —After being closed for more than two months because of lack of orders, the steel-making department of the Maryland Steel Co.'s plant at Sparrow's Point resumed operations this morning, affecting a large number of men.

Personal

Leo C. Steinle, of the Niles-Bement-Pond Co., Cincinnati, sailed for Europe on Dec. 14 to act as special representative for that company.

George H. Warner, ore traffic manager of M. A. Hanna & Co., Cleveland, is ill at his home, that city. It is feared he has typhoid fever.

Mrs. Harriet Fisher, proprietor of the Eagle Anvil Works, Trenton, N. J., returned Dec. 22, from a six months visit in Italy. Mrs. Fisher has written a book describing some of her recent journeys abroad.

Robert Porter has been appointed superintendent of the plate and merchant mills at the Lansingville works of the Republic Iron & Steel Co., succeeding H. J. Steinbreder. Mr. Steinbreder recently resigned to become connected with the Leclede Steel Co., St. Louis.

The vacancies created in Theodore Geissmann & Co.'s selling organization, mentioned in a previous issue, are being competently filled by Joseph W. Thurston, formerly with the Bethlehem Steel Co. and G. Elton Studebaker, for years with Joseph T. Ryerson & Sons.

H. Kleinhans, who was formerly identified with the American Locomotive Co., has opened an office in the Oliver building, Pittsburgh, and will engage in business for himself as a dealer in railroad and contractors' equipment, engines, electrical machinery, etc.

Samuel P. Adams, general manager of the Portsmouth Fire Brick Co. at the time of its absorption by the Harbison-Walker Refractories Co., is now affiliated with the Pyro Clay Products Co., Oak Hill, O. Mr. Adams' father was the founder of the Portsmouth Fire Brick Co.

Lionel Samuel, director and joint manager of Cammell Laird & Co., of New York, is not seeking re-election next year, his personal affairs requiring his entire attention. As general agent of the English company, he established its offices in New York some years ago. Mr. Samuel is not only well known in New York, but also in Mexico, and Central and South America, with some of whose governments he has had large business relations.

Obituary

David J. Thomas, treasurer of the Sterrit-Thomas Foundry Co., Pittsburgh, died Dec. 12.

James Buchanan, Brooklyn, N. Y., president of the Magnet Grate Bar Co., died Dec. 22. He was 61 years of age.

Arnold Tanzer, treasurer of the International Steam Pump Co., died Dec. 21 at his home in New York City. Mr. Tanzer was born in Prague in 1841 and later came to this country and graduated from the College of the City of New York in 1859.

Samuel Putnam, who was for 50 years connected with the W. & A. Fletcher Iron Works Co., died at his home in New York, Dec. 16, at the age of 77 years.

Arthur B. Cornelison, aged 47, master roller and head of the rolling department of the standard gage mills of the Edgar Thomson Steel Works, of the Carnegie Steel Co., died Dec. 18.

Fred C. Klein, aged 86, president of the Klein-Logan Tool Co., Southside, Pittsburgh, died Dec. 21. Mr. Klein was a native of Germany and had been a resident of Pittsburgh for 63 years. At the close of the Civil war, with his brother, Mr. Klein organized the Birmingham Tool Co., Southside, Pittsburgh. In 1868, the firm name was changed to the Klein-Logan Tool Co.

Col. Charles James, vice president and general manager of the Kuebler Foundries, Inc., Easton, Pa., died Dec. 23, of uraemic convulsions, aged 66. Col. James had been an English army officer and had the command of an engineer corps during the Boer war. He resided in this country about 30 years in all and at different times was identified with the Berwick Malleable Iron Co., Berwick, Pa., and the Norway Malleable Iron Co., York, Pa.

Steel Corporation Bonus Distribution

New York, Dec. 27. (By wire.)—Judge Gary today announced that the United States Steel Corporation's annual distribution to employes under the bonus plan would be $1,450,000. Employes will have the right, as usual, to subscribe for 25,000 shares of stock at a price not yet fixed, but the statement says it will probably be a little lower than the market.

A meeting of the stockholders of the Anglo-American Iron Co. will be held in the company's offices, 808 Perry-Payne building, Cleveland, on Jan. 25, 1912, for the purpose of taking action upon the proposition to surrender and abandon the corporate authority and franchises of the company.

At a special meeting of the stockholders of the Woodward Iron Co., held in Birmingham, on Dec. 19, the recent purchase of the Birmingham Coal & Iron Co.'s lands was unanimously ratified.

Republic Iron & Steel Co.'s No. 4 Blast Furnace

Description of the New Stack Added to the Haselton Group of This Company at Youngstown, O.

The Republic Iron & Steel Co., Youngstown, O., recently has added a fourth stack to its blast furnace group at its Hazelton plant. It is the largest of the four stacks and is of modern construction throughout. A general view of this plant, showing the stack and the hot blast stoves, is illustrated in Fig. 1. Fig. 2 is a ground plan of the plant and Fig. 3 is a cross-section showing the 10-ton ore bridge, bins, stack, electric hoist and counterbalance towers. Fig. 4 illustrates the charging side of No. 4 furnace and shows also the ore bridge.

This group of furnaces, which consists of a stack built in 1867, two erected in 1906 and No. 4, which was recently completed, graphically illustrates the gradual improvement and advancement in blast furnace design and construction. Stack No. 1, which was built in 1867, is one of the oldest furnaces in the Mahoning valley, and while it has been remodeled several times, having been practically rebuilt in 1896, it is still strictly typical of the old-fashioned, hand-filled furnaces. This stack has a bosh diameter of 16 feet 9¾ inches, is 74 feet 5¼ inches high and is equipped with four Cowper-Kennedy stoves, to which a fifth is now being added. It has a daily capacity of 300 tons.

Furnace No. 2.

No. 2 furnace was built in 1906 and while it is a hand-filled stack, it is modern in many particulars, having steel bins for the receipt of all raw materials. The material is discharged into the bins direct from the cars by a traveling ore bridge and is delivered to the hand barrows by gravity, thereby eliminating hand labor. This stack is 85 feet high, has a bosh diameter of 19 feet 6 inches and is equipped with four Kennedy stoves. The daily average capacity is 400 tons.

No. 3 furnace, also built in 1906, is provided with mechanical charging equipment and has steel ore bins and electrically-operated larries for conveying the material direct to the skip car. These bins, which are of the parabolic type, are a continuation of the bins for No. 2 furnace and are served by the ore bridge and also receive material direct from drop-bottom cars. This furnace is 85 feet high, has a bosh diameter of 20 feet 6 inches and is equipped with four Kennedy stoves. The daily average capacity is 450 tons.

Furnace No. 4 is equipped with a mechanical charging device and is provided with a single skip hoist, so arranged that two skip buckets are used, one being in filling position while the other is being tilted. These buckets rest on cars in the skip pit at the bottom of the incline and are arranged to travel back and forth on a semi-circular track. Provision is made for rotating the buckets on these cars to overcome any irregularity in the distribution of the stock. The overhead bin system is a continuation of that which serves furnaces Nos. 2 and 3 and the ore and limestone are conveyed to the skip buckets in larry cars, while the coke is discharged direct from the bins into the skip buckets. The stack is of exceedingly heavy construction, the shell being one inch thick. It is equipped with a Kennedy closed top with four openings leading into two downcomers, a large dust catcher and a Mullen gas washer, through which all of the gases pass before being ad-

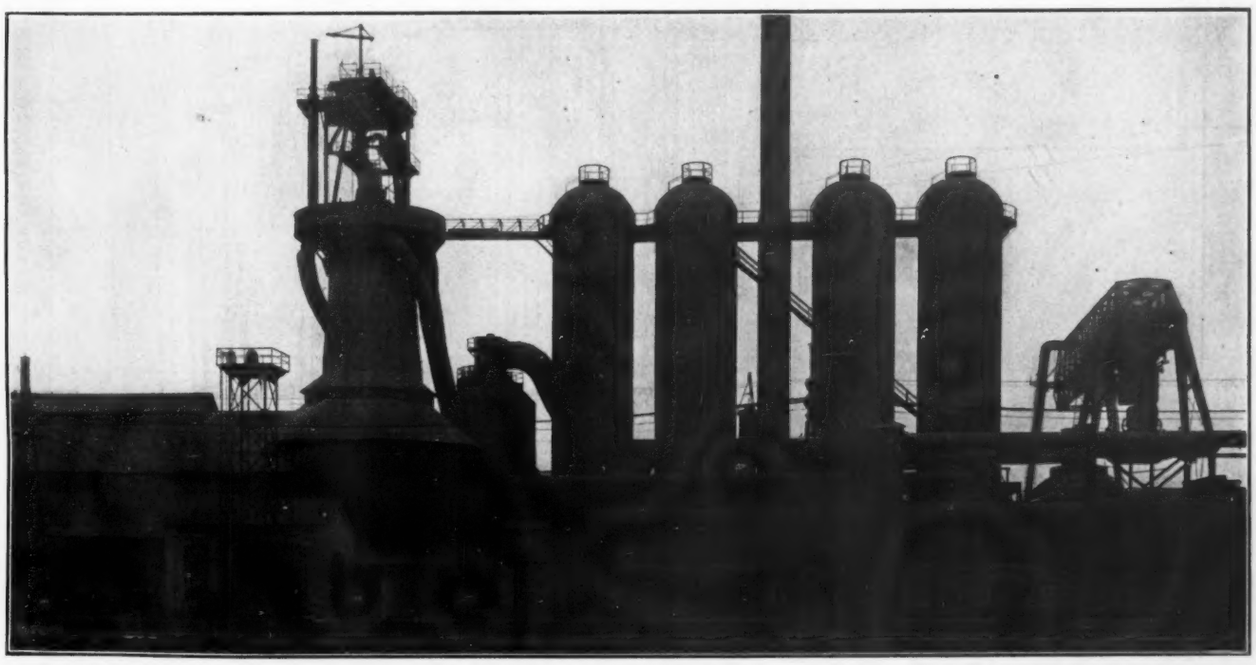


FIG. 1—BLAST FURNACE NO. 4 OF THE HASELTON PLANT OF THE REPUBLIC IRON & STEEL CO., SHOWING THE STACK AND STOVES

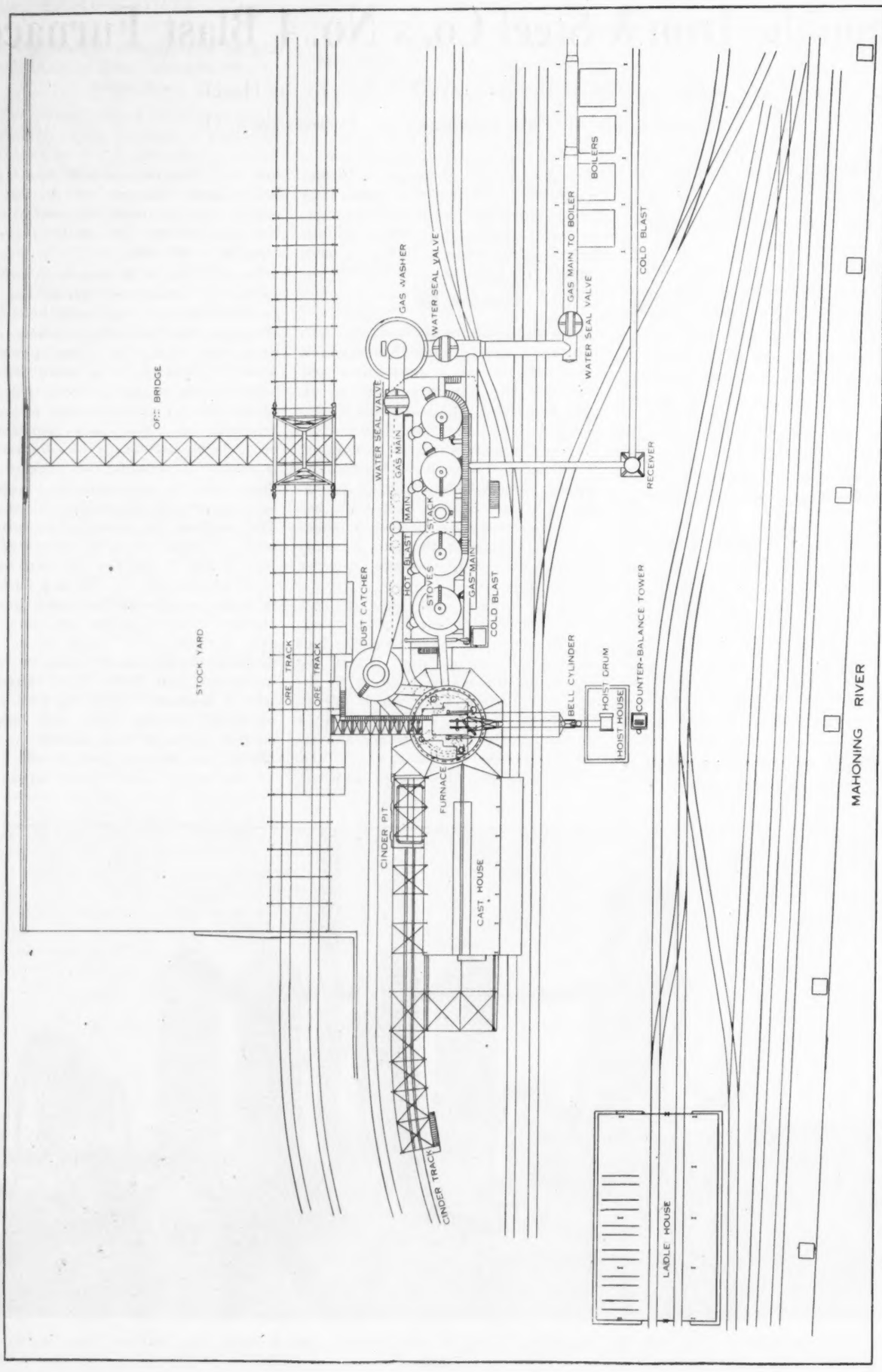


FIG. 2—GROUND PLAN, SHOWING THE GENERAL ARRANGEMENT OF BLAST FURNACE NO. 4, BUILT AT THE HASELTON PLANT OF THE REPUBLIC IRON & STEEL CO.

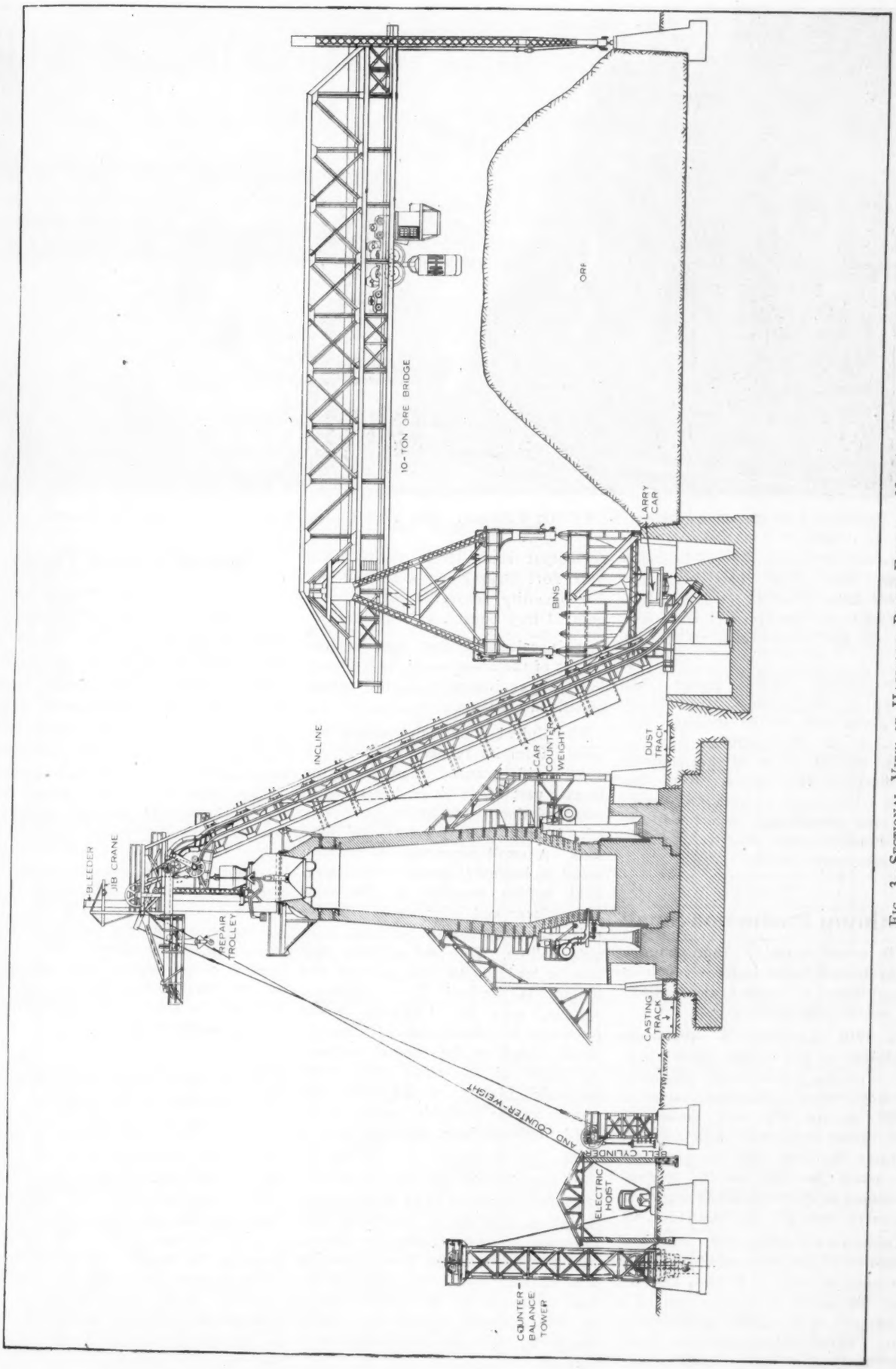


FIG. 3—SECTIONAL VIEW OF HASELTON BLAST FURNACE NO. 4

FIG. 4—THE CHARGING SIDE OF NO. 4 BLAST FURNACE; THIS VIEW SHOWS ALSO A PART OF THE ORE BRIDGE

mitted to the stoves and the furnaces of the boiler plant. This stack has a bosh diameter of 22 feet, is 16 feet in diameter at the top and is 90 feet high. It has a daily capacity of 500 tons.

The boilers, engines, pumps, etc., for all of the furnaces are each in one group and are so arranged that any one of the furnaces can be served by any or all of the auxiliary machinery. Hot metal from this stack is delivered to both the Bessemer and open-hearth departments of the Republic Iron & Steel Co. by the company's private railroad.

Platinum Production Small

The entire output of crude platinum in the United States is recovered from placer mines in Oregon and California, which also produce gold.

In 1910, according to Waldemar Lindgren, of the United States geological survey, these mines produced 390 troy ounces of platinum, valued at $9,507, against 673 troy ounces in 1909, valued at $12,803. This decrease in value obviously does not represent the actual decrease, as the average price paid in 1910 was $24.38 an ounce, compared with $19 an ounce in 1909.

California's production in 1910 amounted to 338 troy ounces of crude platinum, valued at $8,386. Of this total 304 ounces was recovered as a by-product in dredging operations in Butte, Yuba and Sacramento counties. In Oregon the principal reported output comes from beach sands near Port Orford and near Bullards. The quantity recovered in 1910 was only 53 troy ounces, valued at $1,121.

It is calculated that the domestic output of the crude metal from placers in 1910 is equivalent to 273 fine ounces of refined platinum.

The United States mint obtains annually from its refinery operations a considerable quantity of platinum, the largest part of which is derived from scrap platinum and from sweepings, etc., bought from jewelers and dentists. A small percentage of primary metal is, however, obtained in refining gold bullion received at the mint from placer and lode mines. Private refineries also separate platinum from gold bullion. The best estimate that can be made as to what part of this output is derived from domestic sources, says Mr. Lindgren, would probably be about 500 fine ounces, which added to the refined platinum equivalent of the crude metal from domestic placers would give 773 ounces as the probable output of refined platinum from domestic ores in 1910.

A considerable quantity of refined platinum, estimated to be 4,800 ounces, valued at $156,960, is produced from imported crude platinum, the largest part of which comes from Colombia and Russia. The total output of refined platinum in the United States, of both domestic and foreign origin, was about 5,573 fine ounces, valued at $182,237.

Cement-Coated Plates

The Panama canal commission is conducting tests to determine the value of cement mortar, applied to iron plates by means of the cement gun, as a preservative. Twelve plates have been coated with a 1 to 3 aggregate of cement and sand, after having been cleaned by the sand-blast process. Six of these have been coated with a ½-inch coating, and the remaining six with a 1-inch coat on one side and a 1½-inch coat on the other. Three plates of each kind will be kept immersed in salt water for corrosion tests. At the end of three months, two plates of each kind will be removed from the salt water and a portion of the coating will be removed to determine the condition of the metal. The duration of the test for the balance of the plates will be determined later.

A convention of the truck agents of the Speedwell Motor Car Co., Dayton, O., was held in that city on Dec. 11, 12 and 13. The subject of power trucks was discussed by R. H. Croninger, who is now in charge of the truck department of the Speedwell company and addresses also were delivered by the officers. On Monday evening the agents attended a vaudeville theater party and on Tuesday evening dinner was served at the Dayton Automobile Country Club and a toast was responded to by Mayor Burkhardt of Dayton.

The Manufacture of Iron and Steel in Italy

Complete List and Brief Descriptions of Italian Blast Furnaces, Steel Works and Rolling Mills

At the recent meeting of the Iron and Steel Institute, held in London, a paper reviewing the present state of the metallurgical industry of Italy, was presented jointly by L. Dompe and F. S. Pucci, of Milan. In it was included considerable data concerning the iron and steel works of Italy which shed a favorable light on the present trend of metallurgical development in that country.

Although iron has been produced in Italy in more or less limited quantities since the time of the ancient Etruscans, the industry did not assume any degree of importance until the latter part of the last century. It was during the 80's that a number of the present large works were established and in 1883 the industry displayed distinct signs of improvement. During that year the production, as shown on the accompanying chart, was as follows: Iron ore, 200,000 tons; pig iron, 25,000 tons; wrought iron, 90,000 tons; puddled steel, 3,400 tons. The latest available statistics, those for 1910, show a significant increase; the following are the figures for that year: Iron ore, 551,000 tons; pig iron, 353,000 tons; wrought iron, 311,000 tons, and steel, 732,000 tons. The value of these products in 1910 amounted to about $49,400 000. The puddled iron made directly from pig iron in 1910 amounted to 12,800 tons, 11 puddling furnaces having been employed in its manufacture. For the production of the 732,000 tons of steel, there were in operation, 60 open-hearth furnaces, four Roberts converters, two Bessemer converters and two electric furnaces.

Italian Steel Syndicate.

Agreements have been concluded among the Italian iron manufacturers for the rational division of the tonnage and these have already led to the formation of a syndicate which includes the following firms: Ilva, Elba, Siderurgica di Savona, Metallurgica di Sestri, Ferriere Italiane and the Piombino steel works. These companies have agreed to maintain the syndicate for a period of 11 years, dating from July 1, 1911. Further advantages are anticipated from the recent formation of the Iron and Steel Association, a joint combination of the steel works and the principal iron merchants of the country, the object of which is to regulate the distribution of tonnage.

The districts most favored by natural conditions for the development of the iron industry in Italy are the island of Elba and the opposite Tuscan coast; also Liguria, Lombardy and a few other localities. Of the charcoal furnaces of Brescia and Bergamo, which at the height of their prosperity, about 1860, numbered about 20 and smelted about 34,000 tons of ore annually, only two are now in existence, and ore mining operations have also been greatly reduced. There is a possibility, however, that the industry in those provinces may be revived, since the ore deposits have never been fully proved, nor system-

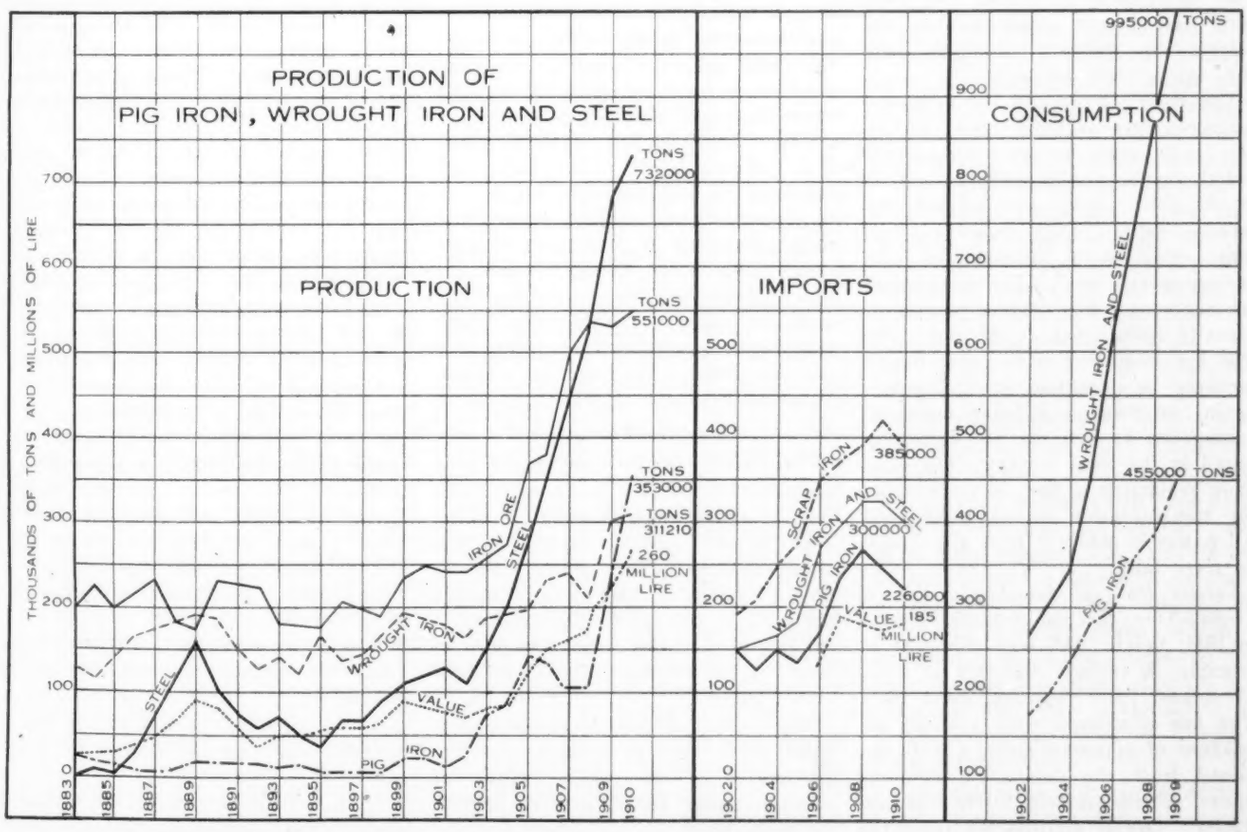


CHART SHOWING THE PRODUCTION OF IRON AND STEEL IN ITALY, IMPORTS AND CONSUMPTION

atically exploited, and modern methods have never been introduced.

The greater portion of the pig iron produced in Italy is smelted in coke blast furnaces. Only 4,296 tons of charcoal iron were produced in 1910. This tonnage was made in old stacks of small capacity operated by the Gregorini di Castro and F. Griffin di Gavazzo companies in Lombardy. The output of coke pig iron in the same year was 348,943 tons, produced by the Ilva, Elva and Piombino companies.

The first part of the report is devoted to the concerns in Italy, which operate their own blast furnaces and the equipment of these plants is fully described. Included in this section is a description of the Terni works, which also originally operated blast furnaces.

Blast Furnaces in Italy.

An abstract of the report follows:

Giovanni Andrea Gregorini, Ltd.—Two charcoal furnaces; height, 34.4 and 29.5 feet; daily capacity, ten and seven, to eight tons, respectively. Gas is washed in a Langlas apparatus and used in reheating furnaces and for heating the blast. Blowers, of the Tatzel type, are direct-connected to an 80-horsepower Pelton wheel and deliver air at a pressure of 5½ inches. The ore is calcined siderite and magnetic oxide, both obtained from the neighboring valleys. Foundry iron and spiegel are produced.

The rolling mills and the reheating furnaces were recently rebuilt. The new installation includes two open-hearth furnaces with a daily capacity of 30 tons each; one open-hearth furnace with a daily capacity of 15 tons; one Kjellin furnace for producing special steel. The steel works are served by five cranes, ranging in capacity from seven to 30 tons. The iron for treatment in the open-hearth furnaces is imported from Tuscany, Spain and Sweden, it being more advantageous to sell the pig iron produced in the local market. The company maintains a line of ferry boats for transportation across Lake Iseo. All power is obtained from the Tinazzo river falls.

Societa Italiana Metallurgica Franchi Griffin.—One charcoal furnace, erected in 1835; height, 33.9 feet; diameter at crucible, 36 inches; diameter at bosh, 85 inches; daily capacity, eight tons. The ore is siderite with a small admixture of magnetic oxide and is obtained from the company's Brunone mines, which produce 10,000 tons annually. Ore is transported from the mines to calcining furnaces by an aerial rope haulage system which has a capacity of 30 tons daily. Foundry and steel-making grades of iron are produced.

Elba Co.—Three blast furnaces with an average daily output of 170 tons; each furnace has four Cowper hot blast stoves. Two of the furnaces are equipped with vertical electric charging hoists, and the third is served by an inclined charging hoist; this furnace is equipped with a rotating automatic bell with a double seal of the Benrath type. The power plant consists of one Cockerill, 1,500-horsepower, gas-driven blowing engine; one Klein, double cylinder gas engine, 1,500-horsepower; two Klein, single-cylinder gas engines, 1,500-horsepower; one Cockerill, 1,500-horsepower steam engine, and one La Meuse, 1,500-horsepower steam engine. The electric generating plant consists of two Nuremberg gas engines, 1,200 and 750-horsepower, respectively; one vertical, 500-horsepower gas engine of the Savoia Palmer type; two steam engines, 1,200 and 700-horsepower, direct-coupled to dynamos. The gas for driving the gas engines is washed twice, the Zschocke system being used.

The company mines its ore in Elba. This ore contains from 50 to 65 per cent iron. In 1910, about 1,500 operatives were employed and 500,000 tons of ore were mined. The ore is conveyed by a rope haulage system from the mines to the coast and by vessel to the company's furnaces at Portoferraio. It is also sent to Piombino and Ilva.

The coke ovens are of the Bernard and Koppers types. The former are arranged in two parallel batteries of 60 chambers each. The ovens each have a capacity of three tons of coke in 24 hours. The Koppers ovens are in two batteries, one consisting of 40 and the other of 60 chambers. Each chamber has a capacity of four tons of coke daily. The daily production is about 760 tons.

Electric Furnaces.

The steel works consist of two eight-ton Bessemer converters. The iron from the blast furnaces is delivered to a Cockerill mixer, of 150 tons capacity. Two small cupolas supply spiegel. Two large cupolas are held in reserve in the event of a failure of the blast furnace supply of iron. About 350 tons of steel are produced daily.

The electro-metallurgical plant contains three electric furnaces for the production of 10 tons of carbide of calcium daily, and one steel furnace of a modified Stassano type.

The company owns a pier, 985 feet long, at which ships of 8,000 tons capacity can be moored. The pier is equipped with four electric traveling cranes for handling coal and five cranes for handling ore. In addition, the company owns four other piers, each 260 feet long.

The works are traversed by a network of 8.7 miles of railway, both broad and narrow gage. The rolling stock consists of 17 locomotives and 100 cars. The company also operates a brick plant with a capacity of 20,000 bricks daily.

Societa Alti Forni Fonderie ed Acciaierie di Piombino.—Iron is produced in three blast furnaces having a daily capacity of 480 tons. They are equipped with inclined charging hoists and the tops are sealed by Parry cones, coupled to Langen bells. The blast for the two large stacks is heated by nine Cowper stoves and for the small stack by three stoves. The gas is cleaned by five large dry scrubbers and two centrifugal wet washers. An auxiliary diaphragm washer has also been installed. The washed gas drives the blowing engine and four other engines coupled to generators which have a total capacity of 10,000 horsepower.

Rolling Mills.

Coke is produced by 74 Otto ovens which have a daily capacity of 400 tons. After by-product recovery, the gas is used partly for heating the ovens and the remainder is burned under the boilers. The construction of a new battery of ovens was begun in 1910.

The steel works are equipped with a 150-ton mixer; three basic open-hearth furnaces, one of 50 tons and two of 65 tons capacity; the output totals 450 tons of steel in 24 hours.

The rolling mill equipment follows:

One two-high reversing mill with 40-inch rolls which cogs three-ton ingots down to various sections; these are cropped by electric shears which take billets up to 14 inches square; the mill is driven by a reversing steam engine of 12,000 horsepower capacity.

One two-high reversing mill with three stands of 33½-inch rolls for rolling heavy sections.

One three-high blooming mill, with 24-inch rolls.

A three-high finishing mill with two stands for rolling sections of medium weight.

A two-high mill of six stands with 12-inch rolls, for rolling small sections.

Each mill is served by an electric crane for roll changing; rails and other sections are transported to the

stock yards by high speed cranes equipped with lifting magnets. The output of the mills averages from 800 to 1,000 tons in 24 hours.

The foundry is in two sections and is served by four traveling cranes. In one section, water and gas pipes, from 1½ to 16 inches in diameter, are cast. In the other, castings up to 30 tons in weight are produced.

The power house contains two gas-driven blowing engines of 1,500 and 750 horsepower capacity, respectively; one steam blowing engine, 1,200 horsepower; four gas engines, each driving 1,500-horsepower alternators; two turbo-alternators, 1,500 horsepower each. The gas engines are driven either by blast furnace or coke oven gas.

The company owns two lines of private railway with the necessary rolling stock. It has dredged a bay to a depth of 20 feet and has built a wharf 985 feet long. The wharf is provided with cranes for unloading and the material is transported to the works by trucks which run on an inclined rope railway. A cement works is also operated. The company employs about 2,500 men.

Use of Blast Furnace Gas.

Ilva Co.—Iron is produced by two blast furnaces, each having capacity of 200 to 250 tons daily. Their dimensions are: Height, 74 feet; diameter of crucible, 12.5 feet; diameter of bosh, 21.3 feet; diameter of throat, 14.8 feet. Four other similar stacks are to be erected in the near future. The charging skips are cylindrical, with loose conical bottoms; their contents are discharged into the furnace by dropping the bottoms; at the same time a cover drops on the top of the cylindrical skip, thus preventing the escape of gas. The crucibles are lined with graphite bricks and each furnace is provided with eight tuyeres. Four Cowper stoves, 98.4 feet high and 26.2 feet in diameter, heat the blast. The ores used are hematite and magnetite from Elba, and the iron is either cast into pigs or is delivered in the molten state to the steel furnaces. The washed gas is used to heat the stoves, boiler and furnaces in the steel works. The power equipment consists of two two-cycle, gas blowing engines of 1,500 horsepower capacity; two 1,500-horse power steam blowing engines; one Nuremburg gas engine, four-cycle, 1,500 horsepower, driving a dynamo; two Klein gas engines, two-cycle, 750 horsepower, each driving a dynamo; two Tosi steam engines, 750 and 200 horsepower, each driving a dynamo.

The steel works are equipped with five basic open-hearth furnaces of American design, and one mixer. Five similar furnaces and a second mixer are to be added. The charging platform is elevated 16 feet and is equipped with an electric charging machine and two 40-ton cranes for charging the molten iron; also two 90-ton cranes for charging the mixer and for handling the metal from the steel furnaces.

Blooming Mill.

In the rolling mill, which is about half completed, a blooming mill has lately been placed in operation; it is driven by a 7,000-horsepower reversing steam engine and its rolls are 46 inches in diameter. Two other large mills are nearing completion, one two-high with 36-inch rolls and the other three-high, with 30-inch rolls, both driven by steam engines of 10,000 and 7,000 horsepower, respectively. A second blooming mill, a plate mill and other smaller mills are projected.

The company owns railroad sidings and piers served by traveling cranes which permit the handling of 5,000 tons of material daily. Vessels of 6,000 tons can tie up at the piers. The works are served by a private railway over 18 miles long. The company employs about 2,000 men. The Ilva Co. was founded in 1904 and its plant is one of the most modern in Italy.

The iron and steel manufacturers listed in the foregoing section of this report operate their own blast furnaces. In addition, there are a number of rolling mills without blast furnace affiliation. A list of these works follows:

Societa Ligure Metallurgica, Sestri Ponente.—The steel works are equipped with six basic open-hearth furnaces; one has a capacity of 15 tons, one of 12 tons and four of seven tons each. The gas producers are of various types and all are blown with steam. The total production is 55,000 tons annually. Each furnace is served by a hydraulic crane, but two electric traveling cranes will soon be added. Charging is still performed by hand. Two furnaces for burning dolomite have been installed near the steel works. These works are connected by a double-track railway with iron forges of the company at Chiaravagna. Forges are also operated at Multedo. The demand for puddled iron is decreasing, however, and the company is preparing to install an electric furnace at Multedo for the manufacture of special steel. This concern employs about 1,500 men.

Societa Siderurgica di Savona.—This is an old plant which was rebuilt in 1903. The steel works contains five 30-ton and one 18-ton basic open-hearth furnaces, and one 15-ton acid open-hearth. Two electric charging machines have been installed and the casting bay is served by five electric traveling cranes and two gantry cranes.

Societa Ferriere di Voltri.—The steel-making equipment consists of three basic open-hearth furnaces, one of 20 tons and two of 14 tons capacity each. They are supplied with gas by four Morgan producers. Mechanical charging with electrical apparatus has been adopted. The ingots, up to one ton in weight, are cast in the foundry attached to the steel works. The ferro-silicon required is manufactured electrically at the company's plant at Darfo in Lombardy. The steel output is 36,000 tons annually, while the wrought iron production is 10,000 tons a year.

Societa Delle Ferriere Italiane.—This concern operates four open-hearth furnaces of 25 tons capacity each. They are fired with gas from Poetter gas producers, blown with air mixed with a minimum quantity of steam. Four electric hoists and a Stuckenholz overhead charging machine have been installed. The works employs about 1,000 men.

Naval Equipment.

Societa Italiana Gio. Ansaldo Armstrong & Co.—This concern operates six establishments as follows: Machine shops at Sampierdarena; naval yards at Sestri Ponente; repair and rigging yards at the port of Genoa; electric engineering works, steel works and foundry at Cornigliano Ligure. The steel works, containing two basic Siemens furnaces and a 30-ton basic open-hearth furnace, was recently placed in operation. A 50-ton furnace is also nearing completion and a six-ton Girod electric furnace will also be installed. When the new equipment is in operation guns, armor plate, projectiles, etc., will be manufactured.

Societa Ferriere Piemontese, Turin.—This concern operates two open-hearth furnaces, one acid and one basic, each of 12 tons capacity. A third is held in reserve and a fourth is in course of construction. This company has a plant near Avigliana which is equipped with an experimental furnace for the treatment of scrap with charcoal, also two open-hearth furnaces having capacities of 15 and 10 tons, respectively.

Societa Anonima Industrie Metallurgiche, Turin.—The steel-making plant of this company consists of two Rob-

erts converters, each having a capacity of 1.6 tons.

Societa Accieraierie e Ferriere Lombarde.—Three 30-ton, basic, open-hearth furnaces comprise the steel works equipment. The gas producers are of the Siemens cylindrical type, blown with mixed air and steam. An electric charging machine, carried on an overhead, 25-ton crane, has been installed. The company also operates a rolling mill.

Societa del Laminatoio di Malavedo di Lecco.—This concern operates three open-hearth furnaces, the entire production of which is rolled in the same plant.

Societa Acciaieria e Ferriere del Caleotto di Castello Sopra Lecco.—This company operates one open-hearth furnace which has an output of 20 tons of mild steel per day.

Fonderia Milanese di Acciaio.—At these works steel castings were first manufactured in Italy in 1888. This plant contains three one-ton Roberts converters, and two basic open-hearth furnaces of five tons capacity each. Four Stassano electric furnaces were recently installed.

Societa Tubi Mannesmann di Milano.—This company was established in 1908 by the Mannesmann Tube Works, of Dusseldorf, and the Italian Metallurgical Co., of Rome, and controls the patent rights in Italy for the manufacture of seamless steel tubes. The plant is equipped with two Heroult electric furnaces, each with a capacity of 20 tons per day.

Societa della Ferriere di Udine e Pont San Martin.—One 20-ton basic open-hearth furnace was installed in 1905, and a similar furnace was added in 1910.

Societa Alti Forni Fonderie e Acciaierie di Terni—This company operates two steel plants; the works known as No. 1 contain two 20-ton and three 40-ton basic furnaces; also a smaller furnace for experimental purposes. Another furnace of the Siemens type is used for the preliminary heating of special alloys. All these furnaces are fired by gas from lignite gas producers. No. 2 melting house contains two 50-ton basic furnaces. A third furnace is used for heating or melting alloys to be added during refining operations. A Wellman charging machine is suspended from a crane. Iron is refined in two Danks rotary furnaces. The production of puddled iron is 24 tons per day and the output of the steel works is 700 tons.

The rail mill operated by this company consists of three stands of 20-inch rolls, and is driven by a 150-horsepower turbine. The armor plate mill is three-high and is of the Lauth type. The upper and lower rolls are 38 inches and the center roll 24½ inches in diameter. The rolls are driven by a 1,000-horsepower turbine at 240 revolutions per minute. The average daily output is 130 tons of armor plate or 80 tons of tank plate. A new armor plate mill was recently installed. This is a two-high reversing mill with rolls 14 feet, 8 inches long and 49 inches in diameter. The tire rolling mill consists of two vertical, parallel rolls driven by an 800-horsepower turbine. The forging department contains two 6,000-ton presses, a 5,000-ton press and several smaller hammers and presses. The gun tempering and annealing plant is provided with 60-ton and 20-ton electric traveling cranes.

Armor Plate Furnaces.

The department for the treatment of armor plate contains 14 furnaces for cementation and reheating, fired with lignite gas, and two coal-fired furnaces for reheating the plates after the final hardening for the correction of any defects. A plant for hardening by the Krupp process has also been added.

The armor plate finishing shop is the oldest and most important of the machine shops. Nineteen of the largest machines are driven by individual turbines. The plates are finished at the Vickers-Terni Works, at Spezia.

In addition the works includes a projectile shop, containing presses, reheating furnaces, heat treatment furnaces, tools for capping and loading, etc.; fitting shop; steel foundry department for the preparation of refractory material, iron foundry and a chemical laboratory.

Ferriere di Giovanni Valdarno.—This plant consists of four puddling furnaces, with a steam hammer for forging the blooms, and a re-heating furnace for forging piled iron. The puddling furnaces are fired with gas produced from lignite.

Societa la Magona d'Italia.—This company's steel works contain three acid open-hearth furnaces, two of 30 tons and one of 35 to 40 tons capacity.

Ferriera di Torre Annunziata.—This concern is controlled by the Societa Ferriere Italiane. It operates two 25-ton, open-hearth furnaces.

Societa Armstrong di Pozzuoli.—Two 30-ton open-hearth furnaces have been installed for making special steel for guns, etc. Two additional 30-ton open-hearth furnaces and a gas producer plant will shortly be installed.

Cleveland-Cliffs Iron Ore Mines Renamed

The Cleveland-Cliffs Iron Co., Cleveland, has re-named eight of its iron mines in the Gwinn and North Lake districts. The Gwinn district is the new name for what has been formerly known as the Swanzy range. The Smith mine in the Gwinn district is renamed the Gwinn mine, in honor of W. G. Mather, president of the Cleveland-Cliffs Iron Co. The Kidder mine is now the Jopling mine, in honor of J. E. Jopling, chief engineer of the company. The Northwestern mine is renamed the Francis, in honor of an official of the Chicago & Northwestern railway, which at one time owned the mine. The two mines at Cyr, where concrete shafts are being sunk by the Foundation Co., will be named the Mackinaw and the Gardner. In the North Lake district of Ishpeming, where considerable development is going on, the No. 1 mine will be named the Morris, in honor of M. M. Duncan, the general agent of the company's mining department; the North Lake No. 2 mine will be called the Lloyd, in honor of H. L. Smythe, of Harvard University, consulting geologist of the company. The Barnes mine to the west of the North Lake mines is renamed the Chase, in honor of P. P. Chase, of Dexter, Mich., one of the fee owners of the property. The Princeton, Austin and Stephenson mines, in the Gwinn district, and the company's mines at Ishpeming and Negaunee will retain their present names.

Iron Ore in New Zealand

In a consular report on the iron ores of New Zealand, the Parapara deposits in the northern part of the South Island are said to be of vast size, constituting an undeveloped asset of immense economic value. The amount of iron visible is estimated at 64,000,000 metric tons, and the ores that outcrop are all very easy to mine. Siliceous and calcareous fluxes abound in the immediate vicinity, while coking coal is obtainable in limited quantites from a seam about seven miles distant. A concession has been obtained by a syndicate of capitalists at Christchurch, to work the deposits, and is at present conducting operations to sluice off the surface gravels and clays overlaying the iron deposit and will ultimately mine and ship the ore to England. An effort is being made to organize a large company for treating the ores locally.

THE STEELWORK OF THE ORE DOCK AS IT APPEARED SEPT. 25, 1911

Description of Duluth & Iron Range No. 1 Dock

The tremendous strides which have been made during the past few years in the design of electrically-driven machinery for unloading iron ore at lower lake ports are familiar to those engaged in the shipping of ore. The improvement in loading facilities at upper lake ports has been equally pronounced. The problems which have been surmounted in increasing the capacity and efficiency of loading docks have been different in character, but no less in degree than those encountered by the designers of unloading machinery. It is a far cry, indeed, from the primitive methods used in loading the first cargoes of ore carried on Lake Superior in 1853 to the modern ore dock which has sufficient size to berth six 7,500-ton steamers at once and the requisite equipment for transferring and loading 10,000 tons of iron ore in 40 minutes.

The general design of ore loading docks may be said to have become fixed about 1862 with the construction of the first trestle dock at Marquette, Mich. Since that day there have been no important changes in the prevailing type of structure; the improvements during late years have consisted of enlargements, changes in details and in the operating mechanism. The principal features which distinguish the newest ore docks from their predecessors consist in the employment of structural steel in place of timber framing; the extensive use of reinforced concrete, particularly for bin walls; the adoption of a new type of door for controlling the flow of ore, and finally, the substitution of electric power for manual labor in raising and lowering spouts. The last two of these improvements, although affecting only details, have already shown in practice that they will have a far-reaching influence on the capacity and operating economy of the docks. They are justly considered to be among the most important advances that have been made in ore dock design in the past decade.

A new dock, embracing all of the new features mentioned, has been recently completed at Two Harbors, Minn., by the Duluth & Iron Range railroad, a subsidiary of the United States Steel Corporation. The new dock is known as No. 1 and was built to replace an old wooden dock of similar designation.

The new dock occupies the same site as the old structure which it supersedes, its center line being 18 inches from that of the old one and parallel thereto. The structure consists of three parts, a timber approach 225 feet in length, a steel approach 329 feet long and the dock proper, which is 1,376 feet in length, 51 feet 8 inches in width, exclusive of machinery platforms, and 74 feet in height above the mean water level of Lake Superior. There are 112 ore pockets on each side so that the structure has sufficient capacity for loading four of the largest boats at one time. The dock is supported on piles surmounted by a reinforced concrete cap. The posts, girders and general framework supporting and enclosing the ore pockets are structural steel and the partitions between the bins are reinforced concrete. This latter feature consti-

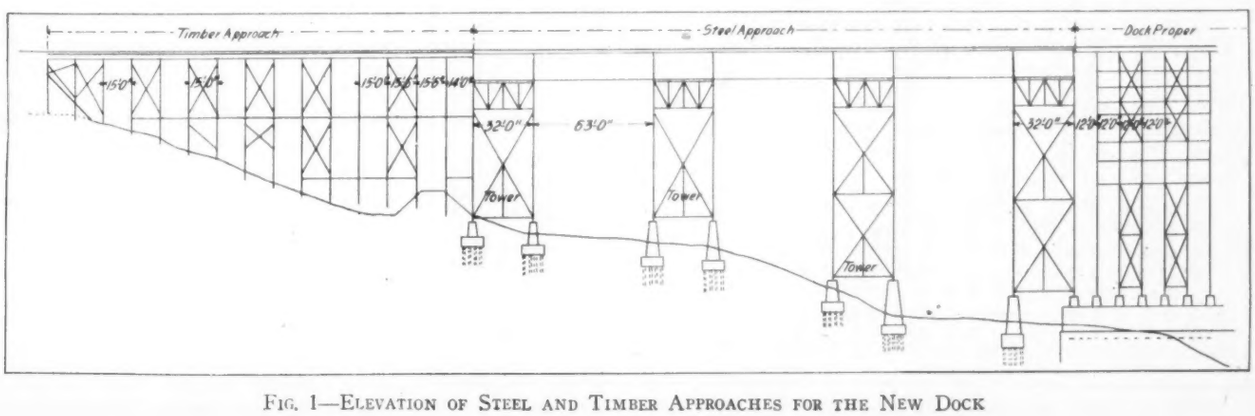


FIG. 1—ELEVATION OF STEEL AND TIMBER APPROACHES FOR THE NEW DOCK

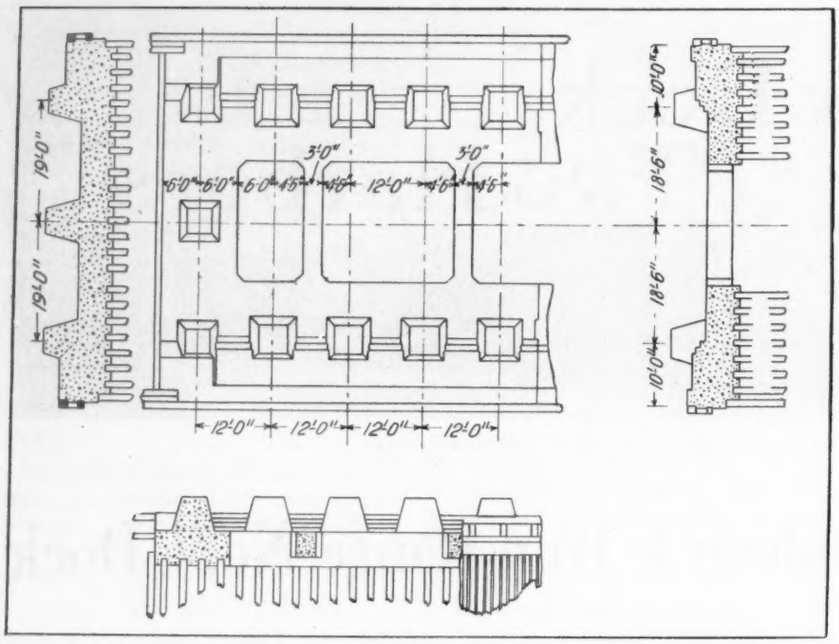


FIG. 2—PLAN AND ELEVATION OF FOUNDATIONS FOR THE DOCK PROPER

tutes one of the chief characteristics of the structure. The bottoms and fronts of the bins are of wood on steel

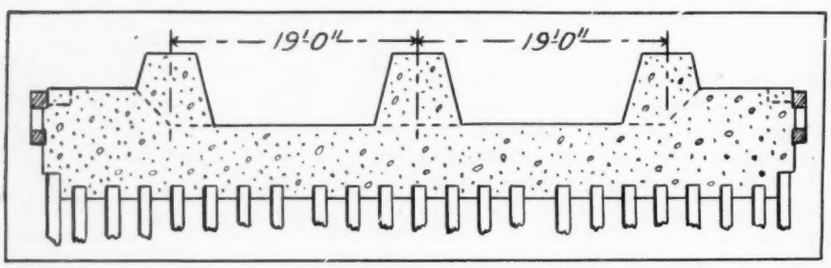


FIG. 3—CROSS-SECTION OF FOUNDATION UNDER STEEL APPROACH BENTS

framing and the slope of the ore pockets is 48 degrees from horizontal. This slope is three degrees steeper than that employed in docks previously constructed by this company, and it is expected that the additional pitch will materially improve the flow of the ore. Four tracks are laid along the top of the dock, two over each

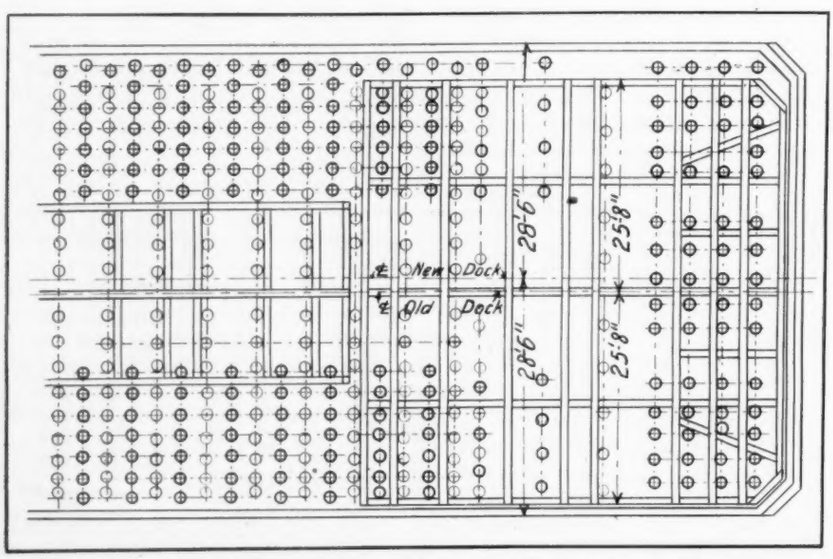


FIG. 4—PLAN OF PILING, SHOWING OLD AND NEW PILES AND OLD CRIB

set of pockets. At the outer extremity of the dock there is an end-tower 32 feet long, designed to furnish a car length of tail room.

Electrically-Operated Spouts.

Electric hoists are used for raising and lowering the ore spouts, instead of the hand-operated winches which have been exclusively employed heretofore. The use of power for this purpose obviates many of the difficulties and delays incident to hand operation and marks a distinct step in advance. In addition, this dock is provided with an improved chute equipped with doors which are guided at the bottom so they can, if necessary, be closed against the flow of the ore without difficulty.

The general features of the dock are shown in Fig. 6 and the details of the approaches are given in Fig. 1. The timber approach, which is 225 feet in length, consists of 14 bents

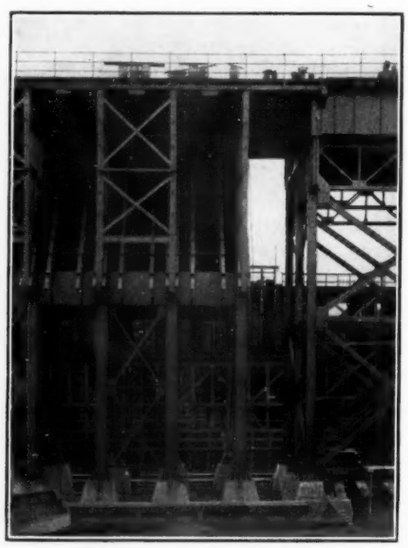


FIG. 5—JUNCTION OF DOCK AND STEEL APPROACH, SHOWING THE FRAMING OF THE ORE POCKETS

spaced 15 feet center to center and framed in the usual manner with suitable longitudinal bracing. The bents are supported on piles. The tracks, two in number, are carried on 8 x 16-inch stringers laid on the caps. The ties are sawed, 8 x 8 inches in section and 14 feet long. The first three bents at the inner end of the timber approach are set on a 9-degree, 30-minute curve and the balance of the approaches and dock proper are, of course, straight.

Steel Approach.

The steel approach, which is 317 feet in length, is situated between the dock and the timber approach. It consists of four towers connected by

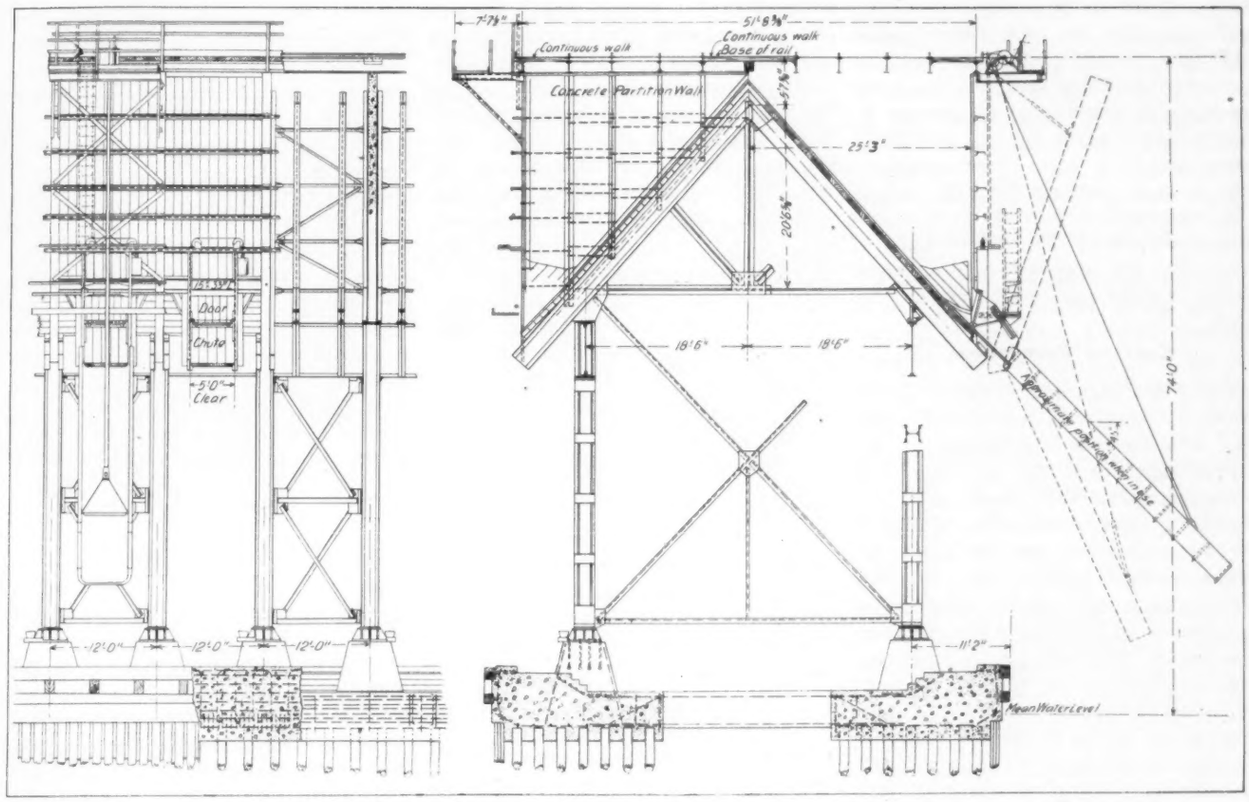


FIG. 6—ELEVATION AND TYPICAL SECTION OF DOCK

plate girders, as indicated in Fig. 1. It is widened on the top so as to accommodate four tracks at the outer end. The girders between the towers are each 63 feet in length, while those over the towers are 32 feet long. From bent one to bent five there are four girders; between bents five and six there are five 32-foot girders and

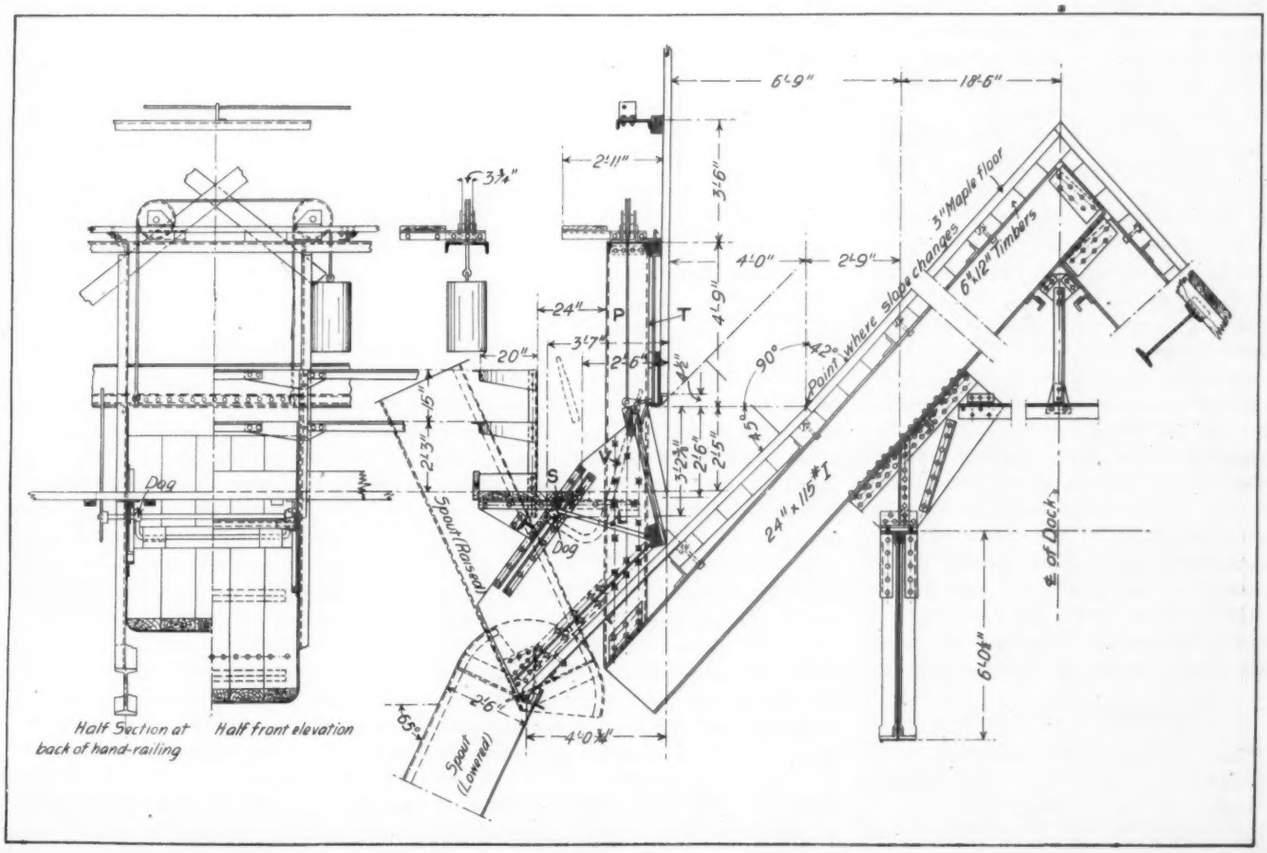


FIG. 7—DETAILS OF ORE CHUTE AND DOOR

from bent six to the outer end of the approach there are six girders; this additional support at the outer end is necessary to take care of the four tracks. The framing of the towers is clearly indicated in Fig. 1, each bent being provided with three columns. The columns rest on concrete pedestals, supported in turn by close-driven groups of piling. The dock proper is level, but the approach has a rising grade of 0.304 per cent towards the dock.

Concrete Foundations.

Fig. 2 is a plan and elevation of the concrete foundations for the dock and Fig. 4 shows the distribution of the piling supporting the concrete. A cross-section for the foundation of the approach bents is illustrated in Fig. 3. As far as possible the old cribs and piling which supported the old dock were utilized and sufficient new piling was driven to have seven piles in each row under each side of the concrete cap, as indicated in Fig. 4, the rows of piling being spaced 3 feet apart. The space in the center between the clusters of piling is filled with sand and gravel and the outer edge of the foundation is surrounded by sheet piling. In Fig. 6 the new piling and sheet piling are indicated by heavy lines and the old piling and old cribs by light lines. The center lines of the bents in the new dock are 18 inches west of the center line of the old dock bents and the approach and end-bents are located accordingly. Wooden sheet piling is used.

The general features of the concrete slab surmounting the piling are indicated in Figs. 2 and 4. The concrete is 5½ feet thick, reinforced longitudinally and transversely by two courses of 1 inch steel bars closely-spaced, and laid about 6 inches from the upper and lower faces of the slab. The steel columns supporting the dock are carried by small concrete piers. The concrete slab is cut away in the middle, as indicated in Fig. 2, and the two sides are tied together at intervals of 21 feet by concrete girders, 3 feet wide and 4 feet deep. The piers which carry the cast iron bases supporting the steel columns, are 4 feet, 9 inches square on top, with a side slope or batter of 1 to 4. The tops of these piers are 8½ feet above the mean water level of the lake.

Structural Features.

Fig. 6 shows the chief structural features of the dock. The columns consist of one 18-inch, 60-pound I-beam, with two plates 24 inches wide and ⅞ inches thick, stiffened on the edges with 4 x 4 x 13-16-inch angles, the whole being riveted together in the form of an H-section. There are two of these columns in each bent, as indicated in the cross-section in Fig. 6, the bents being spaced 12 feet center to center. The columns are 28 feet 1¼ inches in length and the cast iron bases on which they rest are 1½ feet high; the tops of the columns are, therefore, 38 feet 1¼ inches above the mean water level. The columns are surmounted by 72-inch longitudinal plate girders which carry the weight of the bins. The load on each column is estimated to be 1,027,000 pounds. The transverse bracing between the columns in each bent consists of 5 x 3½ x ⅜-inch angles laced as shown in Fig. 6.

The timber filling under the floor in the ore pockets consists of 6 x 12-inch planks resting on A-frames, built of two 24-inch, 115-pound I-beams. A 3-inch hard maple floor is laid on the timber filling.

Pocket Capacity.

Each pocket has a capacity of 4,150 cubic feet and since the weight of the ore is assumed to be 140 pounds per cubic foot, the capacity of each pocket is 290½ tons. The partitions between the pockets are of reinforced concrete, 12 inches thick, suitably braced to withstand the outward pressure of the ore.

There are two tracks over each pocket and the space between the outside rails is open. Each rail is carried on a 20-inch, 65-pound I-beam, supported by steel columns in the concrete partition walls. The tracks are spaced 10 feet 4 inches center to center.

As previously mentioned, the slope of the bin floors is 48 degrees from the horizontal, or 42 degrees from the vertical. This slope changes at a point 8 feet 6 inches above the lower edges of the chutes to 45 degrees, which is the slope of the chutes. The structural steel in each 12-foot section of the dock weighs 131,500 pounds and the cast iron bases supporting the columns weigh 3,300 pounds each.

Ore Chutes.

In the old docks, small chutes, from 2½ to 3 feet in width, are used and there are, in some cases, as many as three openings in each pocket. On account of the improved type of door used on the new dock, this arrangement has been simplified. There is one chute, 5 feet wide in the clear, provided with a free opening from the pocket 3 feet high, the net cross-sectional area being 15 square feet.

The details of this chute and the door are shown in Fig. 7. The latter has some features which are of special interest. Its lower edge is guided by a link, *L*, Fig. 7, the upper end of which slides in the slot *S*. The pressure of the ore in the pocket cannot open the door as long as the dog, shown in the illustration, prevents the upper end of the link, *L*, from sliding freely in the slot. This dog is controlled by the lever, *V*, which extends up to the operating platform. When the lever is rotated, the dog swings clear of the slot and the lower edge of the door is then free to move. The movement of the upper edge of the door is controlled by the vertical slot, *T*.

The Door.

The door is counted weighted, as indicated, so that it moves easily. In operation, as soon as the dog is released, the door is drawn up into the pocket, *P*, leaving the full cross-section of the chute free for the flow of the ore. When it is desired to cut off the flow, the door is lowered and since the lower edge is guided, it is forced into the stream of the ore as it descends. The links and slots are so adjusted that the door describes a certain curve in raising and lowering, with the effect that the resultant pressure from the flowing ore does not interfere with or prevent its closing.

Details of Spout.

The details of the spout and its operating mechanism are shown in the cross-section in Fig. 6. The spout itself is made of steel and is 34 feet in length, 2 feet 6 inches high and 5 feet wide. When in use it has an approximate slope of 45 degrees, but can be lowered until the slope is 65 degrees from the horizontal. A ⅜ x 5-inch flat wire rope is fastened to the spout, and its upper end is wound around a drum connected to an electric hoist situated on the machinery platform at the top of the dock. The hoists are operated in groups from a line shaft, there being 10 drums connected to each motor, making a total of 11 motors on each side of the dock. The hoisting drums and the line shaft are connected by friction clutches controlled by operating levers.

The foundation for the dock was put in by Whitney Bros. & Hill, Superior, Wis., and the steel superstructure was fabricated and erected by the American Bridge Co. The work was under the supervision of W. A. Clark, chief engineer of the Duluth & Iron Range Railroad Co.

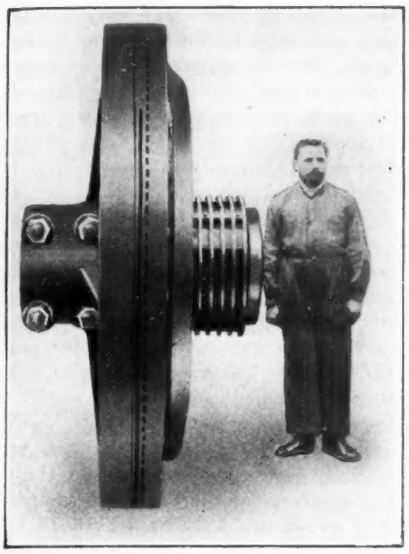


FIG. 1—LARGE MAGNETIC CLUTCH WEIGHING 6¼ TONS

A Powerful Magnetic Clutch

By J. A. Seager

One of the points which has been urged against electro-magnetic systems for power transmission has been, that although they may answer for a time without undue wear, they eventually develop faults which render them so expensive in maintenance as to make them unsuitable as compared with the older forms of transmission gear. In this connection it is interesting to refer the results of more than a year's operations of an electro-magnetic clutch, transmitting 1,000 horsepower applied to a piece of apparatus which, of necessity, required intermittent operation. This is found in a magnetic clutch 7 feet 3 inches in diameter, installed in connection with a motor-driven blowing set at the Ormsby Iron Works of Cochrane & Co., Ltd., Middlesbrough, England. This clutch was installed in February, 1910, by C. E. Lugard & Co., of Chester, England, and is of the type made by the Vulkan Maschinenfabriks Actien Gesellschaft, Vienna. This clutch is illustrated in Fig. 1 and its construction is shown diagrammatically in Fig. 2.

Cochrane & Co. formerly utilized the waste gases from their blast furnaces to drive a gas engine for blowing and also for driving the electric generating plant, and when it became necessary to extend the blast furnace plant, a blowing engine was installed driven direct by an electric motor of 700 brake horsepower continuous rating at 1,000 horsepower for hourly periods. The blowing engine is of the vertical type, having a blowing cylinder 66 inches in diameter and 54-inch stroke. The engine operates at 75 revolutions per minute, its capacity (free air) being 16,000 cubic feet per minute. Fig. 3 shows the general arrangement of this blowing engine and motor with the clutch in place. The motor is a compound wound, 16-pole machine running on a 240-volt, direct current supply from gas-driven generators of about 1,000-horsepower capacity. Its total weight is approximately 37 tons, a good deal of which is in the rotating armature. In addition to this, there was mounted on the blower a fly wheel, 23 tons in weight and having a diameter of 16 feet 8 inches. The demand for power on the gas-driven generator, when the motor and fly wheel of the blower were started up together, was excessive, so that it was decided first to start the motor and then by means of the clutch device, to gradually bring up the blower to speed. This clutch weighs 6¼ tons, and is probably the largest magnetic clutch in the world.

Efficiency of the Clutch.

At the time the installation was made it was specified that it should slip so that no greater than 1,000-horsepower demand was made at any time on the generator. As a matter of fact it has been found that it can be started up in one minute and the load on the generator does not exceed 350 horsepower. Moreover, in order to keep the coils magnetized and thus to keep the clutch in operation, only two kilowatts are required. As the motor is run up on no load to full speed before coupling up the blower, the value of this performance is apparent.

At the right, Fig. 2, is shown the driving portion of the clutch which is magnetized. This part of the clutch is keyed to the shaft. This section contains the annular energizing magnet, which is connected to slip rings, *A*, by means of which electric current is brought to the coils whether the clutch is stationary or in motion. At the left, Fig. 2, is shown a disc mounted on a second shaft by a feather key so that it can be moved lengthwise

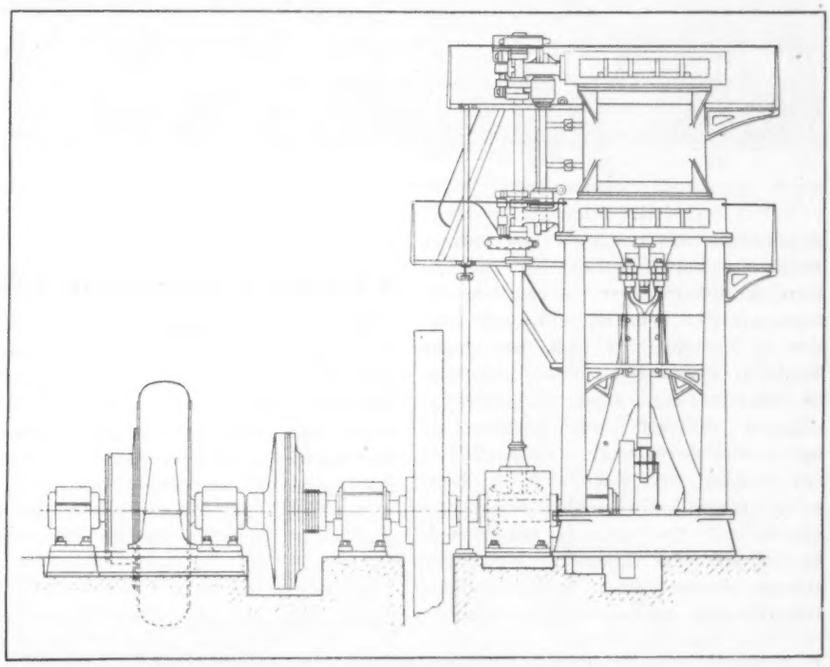


FIG 3—VIEW OF MOTOR-DRIVEN BLOWING ENGINE INSTALLATION, SHOWING THE MAGNETIC CLUTCH INTERPOSED BETWEEN THE ENGINE AND MOTOR

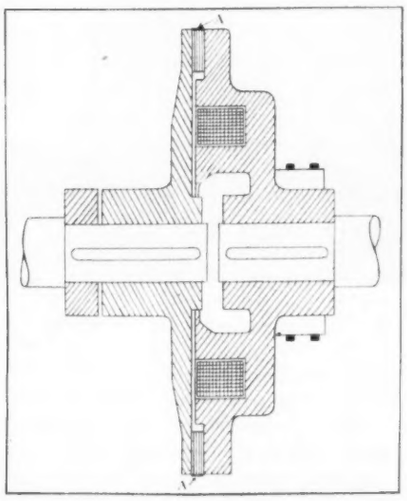


FIG. 2—SECTIONAL VIEW OF MAGNETIC CLUTCH

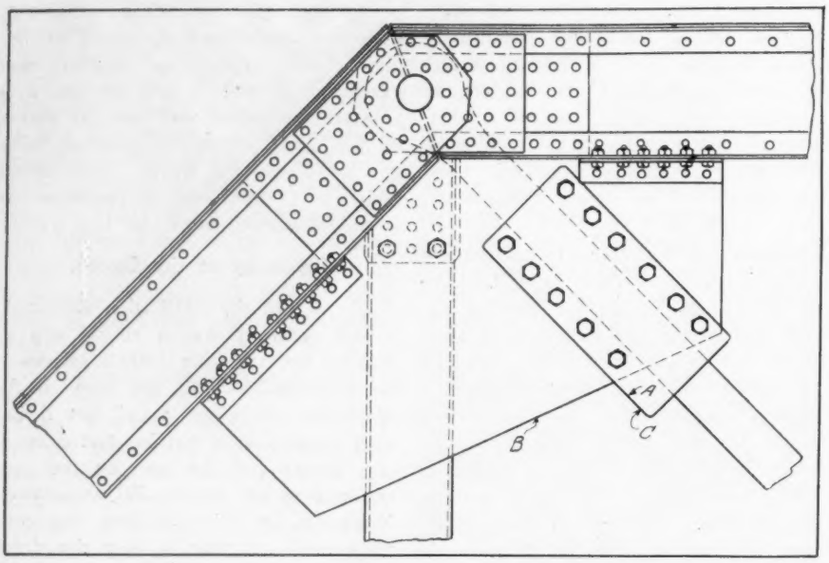


FIG. 1—TEMPORARY CLAMPS AND GUSSETS FOR HOLDING MEMBERS IN PLACE WITH PIN REMOVED

along the shaft for about one-sixteenth of an inch. This might be termed the armature. This armature is provided with a friction thrust ring of hard wood or special friction metal made in halves and easily removable and adjustable and in the larger size springs are placed between the shaft ends to keep the clutch apart when the surfaces are not engaged. The construction of the clutch is such that a gap is always maintained between the magnet surfaces even when the clutch is engaged, so that these surfaces are not susceptible to wear or sticking from any residual magnetism. When, however, current is passed through the magnet coils the magnetic attraction is exerted on the armature which increases as the current is strengthened and causes a rubbing ring to bear on the magnetic body, thus producing frictional contact causing the second shaft to be rotated with the first. It is, therefore, easily conrolled from a distance and it will engage or disengage without shock.

A Unique Bridge Repair Job

It recently became necessary to ream out the bearings and insert new pins in the joints of a certain pin-connected draw bridge on the Chicago, Milwaukee & St. Paul railway. Instead of blocking up the span with falsework and removing the worn members to the shop in the usual manner, a portable boring bar was brought to the job and used to rebore the bearings without taking down any of the members. This saved considerable time and expense and avoided shutting off navigation in the channel spanned by the bridge.

The structure in question crosses the north branch of the Chicago river between Division street and North avenue, Chicago, and was built in 1902. It is 230 feet in length, of the through truss swing type, with unequal arms, and is pivoted on the north bank of the river. The long arm extends across the river and is counterbalanced for overhang. Due to vibration and other forces, the pins and bearings had become so worn that it was deemed advisable to replace them.

Preparatory to removing each pin it was necessary to securely clamp the members at the joint, as indicated in Figs. 1 and 3. This served to secure them during the boring operation. Four steel plates, *A*, were used to hold the eye-bars. These were placed on each side of the eye-bars

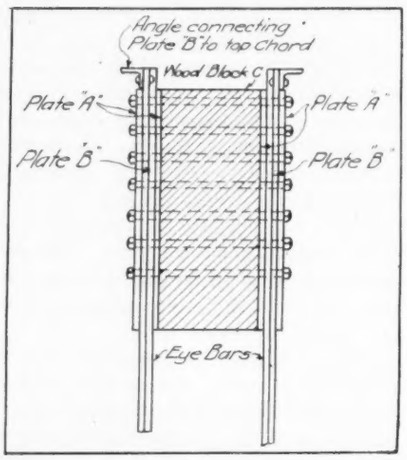


FIG. 3—END ELEVATION OF TEMPORARY CLAMPS

with a block of wood, *C*, fitting tightly between the inner two, while the outer two reinforced the plates, *B*, which were directly in contact with the eye-bars. The whole was bolted together by one-inch bolts, thus developing enough friction between the plates to take care of the dead load stress in the eye-bars. The two plates, *B*, one on each side, were fastened to the lower flange of the top chord and to each end post by angles and bolts, and this supported the hanger by bolts, as shown in Fig. 1. In this manner, when the pins were driven out all members were rigidly clamped in position.

Upon removal of the pins they were found to be considerably worn and their bearings somewhat enlarged. The holes were rebored from the original 5-inch diameter to 5¼-inch diameter by using a Ryerson portable

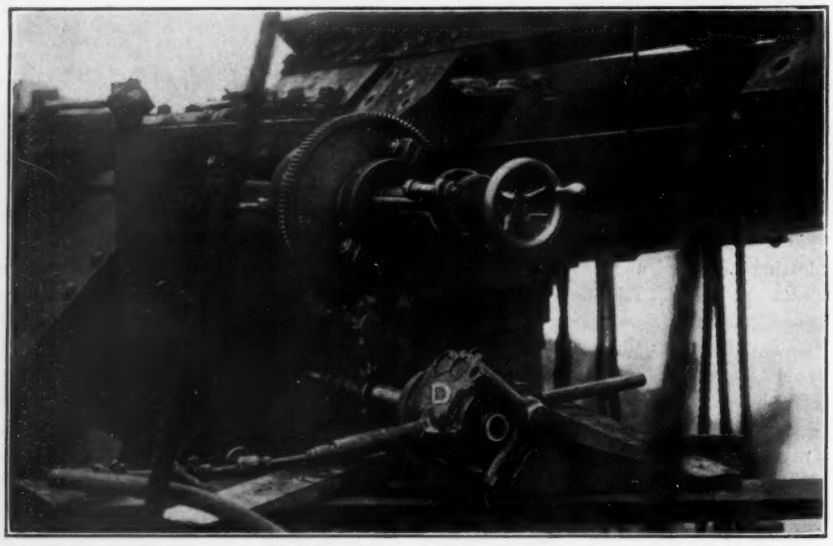


FIG. 2—PORTABLE BORING BAR IN PLACE CONNECTED TO AIR DRILL

boring bar. This bar is made by Joseph T. Ryerson & Son, Chicago, and although designed primarily for boring locomotive cylinders in the shop, nevertheless proved well adapted to the work at hand. Fig. 2 shows the bar in position and the manner of bracing and centering it. The power was applied by an air drill, *D*, Fig. 2, connected to the boring bar by spur gears. The power plant consisted of a section car, containing a gasoline engine and air compressor.

Work on this job was started at 6 a. m., Nov. 6, and by 8:15 p. m. of the same day the four pins had been removed, the holes rebored, new pins inserted and traffic was passing over the bridge. The time taken for the actual work was very short, and the whole experiment proved successful.

New Side-Dump Ore Car

Development in steel car construction is constantly turning to the accommodation of increasingly heavy loads. The recent announcement that the Pennsylvania railroad had prepared specifications for a 52-foot steel car is the extreme limit that the engineers have yet attempted in this class of construction. These cars are designed primarily for the transportation of greater loads of long length material, such as beams, tubes and similar steel products. In a no less advanced degree has been the development of the car design suitable for the transportation of bulk materials. The iron ore trade has adopted some very interesting carriers of this class, in which not only the purposes of large capacity, but likewise of quick unloading facility have been served. An ore car of unusually large capacity and other improved features has recently been put in service by the Bingham & Garfield railway of Salt Lake City, Utah, a subsidiary of the American Smelting & Refining Co. This car is used in the transportation of copper ore from the mines to the smelters. The conditions to be met in the design of the car by the builders arose from the variable and comparatively light nature of the ore, and from the desire of the railroad company for a car of large capacity, which would be perfectly self-clearing and at the same time have a low center of gravity when loaded.

These conditions have been met and the car is giving excellent and satisfactory service. The car has a rated capacity of 120,000 pounds. It is 10 feet high and 31 feet long, center to center of coupler. The capacity of the car is 1,200 cubic feet.

FIG. 1—NEW TYPE OF SIDE DUMP ORE CAR; CAPACITY, 120,000 POUNDS

The slope of the sides, ends and longitudinal ridges are all very steep, the least slope being 52 degrees from the horizontal. The bottoms of the cars, when closed, are in horizontal plane and are operated by a creeping shaft device. The load is dumped outside the rail and the doors are arranged to drop at an angle of 52 degrees. The door opening is over 80 square feet, which affords a large space for the ore to pass through quickly, thus avoiding any tendency of the ore to bridge as it is discharged.

The interior of the car, Fig. 2, is made as free from obstructions as possible. There is no cross-bracing to be damaged by the drop of ore rock from the buckets. This feature is of considerable importance as the ore to be loaded is sometimes dropped from heights of from 10 to 15 feet in rocks weighing from 800 to 1,000 pounds each. Considering the large capacity of the car, both for volume and weight, the center of gravity of the loaded car is very low, being about 6 feet 3 inches from the top of the rail. This new type of car was designed and built by the Pressed Steel Car Co., Pittsburgh, and an order for 120 was recently completed for Bingham & Garfield.

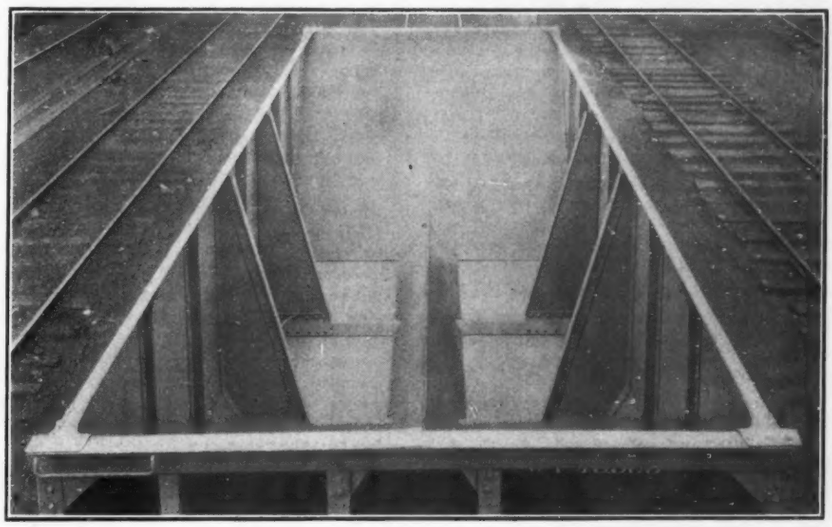


FIG. 2—VIEW OF ORE CAR, SHOWING INTERIOR CONSTRUCTION

McLain's System

In a 12-page pamphlet, published by McLain's System, Goldsmith building, Milwaukee, David McLain, the head of the foundryman's school, recounts his experiences and expresses freely his views regarding the lack of fundamental knowledge in the past, and still existent to some extent among foundrymen generally. The article is entitled, "The Practical Education and Training of Foundrymen," and Mr. McLain's experience shows what may be attained by pluck and perseverance, even under circumstances, which, in the initial stages, were more or less unfavorable to ultimate success.

New Catalogs

LATHES.—The Gisholt Machine Co., Madison, Wis., has issued a new leaflet for binding with its loose leaf catalog. The present leaflet is devoted to lathes.

EXHAUST FANS.—The American Blower Co., Detroit, has issued a bulletin describing its line of steel plate exhaust fans of various types. The bulletin is handsomely illustrated and contains sectional views, data tables, etc.

MILLING MACHINES. — The Kearney & Trecker Co., Milwaukee, has issued a catalog devoted to its line of milling machines. The catalog is handsomely illustrated and contains very complete information concerning the operation and construction of milling machines.

CAN-MAKING MACHINERY, ETC. — Claysman & Co., Baltimore, manufacturers of automatic can-making machinery, power presses, air compressors, and other engineering specialties, have issued a new illustrated catalog.

SINGLE-PHASE CONVERTERS. — The Wagner Electric Mfg. Co., St. Louis, has issued a bulletin devoted to its line of single-phase converters. These converters are recommended for battery charging for electric vehicles; moving pictures and theatrical work; charging of telephone batteries and energizing of telegraph systems; railway signal work, etc.

STOP-VALVES.—A bulletin has been issued by the Lalor Fuel Oil System Co., Philadelphia, which describes that concern's line of automatic stop-valves. This valve is designed for automatically stopping the supply of oil in case of a breakage of the oil lines or abnormal flow to the boilers in fuel oil systems. The bulletin is well illustrated with cross-section views, etc.

THE SINTERING OF FINE IRON-BEARING MATERIALS.—A copy of a paper of the above title, read before the American Institute of Mining Engineers at the Wilkesbarre meeting, June, 1911, by James Gayley, has been prepared by the American Ore Reclamation Co., New York, for distribution to the trade. This paper was published in a recent issue of THE IRON TRADE REVIEW.

AIR COMPRESSORS.—In a 30-page catalog, issued by the American Air Compressor Works, New York City, various types of compressors up to 12-inch stroke, are shown. Dimensions of various sizes are included, together with illustrations of direct-connected, motor-driven compressor units. Air receivers, dry vacuum pumps and air lift pumping systems are also shown.

CROSS-CUT SAWS.—A handsomely illustrated and artistically arranged catalog, devoted to cross-cut saws, has been issued by Henry Disston & Sons, Inc., Philadelphia. In addition to price and lists, the catalog includes much valuable information on the proper setting and sharpening of saw teeth, the swaging of rakers, etc. This booklet should prove of unusual interest to all users of cross-cut saws.

PLANERS.—A new catalog issued by Joseph T. Ryerson & Son, Chicago, is devoted to its line of Rockford planers. These are heavy duty, variable speed machines and may be motor or belt-driven. The catalog is handsomely illustrated and contains numerous cross-sectional views. It is designed to form one of the units of the company's large machine tool catalog now in course of preparation.

ALTERNATING CURRENT WATER WHEEL GENERATORS.—The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has issued a circular describing its line of alternating current, water wheel generators, both vertical and horizontal. This company has adopted several different types of rotor construction, each of which is designed for use with a certain rotor diameter and speed range. These types are all described in detail. Numerous illustrations are included.

WAGE AND BONUS SYSTEMS. — A comparative study of wage and bonus systems is contained in a 27-page booklet, issued by the Emerson Co., 30 Church street, New York City. Various systems are discussed, including the "Time Rate," Piece Rate," "The Halsey One-third and One-half System," "The Rowan Premium System," "The Taylor Differential Piece Rate System," "Gantt Bonus System" and the "Emerson Bonus System."

HEATING AND VENTILATING FANS. —The American Blower Co., Detroit, has issued several booklets devoted to the use of Sirocco type blowers and fans in heating ventilating, humidifying, cooling and hot blast drying systems, mechanical draft apparatus, pneumatic elevating and conveying systems, blast equipment, etc. One of these booklets is devoted particularly to shop heating systems as installed in manufacturing plants; a number of illustrations show typical equipments of this character.

PRESSURE PUMPS.—The Aldrich Pump Department, Allentown, Pa., the designing and selling branch of the Allentown Rolling Mills and the Birdsboro Steel Foundry & Machine Co., has issued a bulletin devoted to Aldrich pumps of the vertical triplex and quintuplex types. These pumps may be electric or belt-driven and are recommended for service in steel plants, boiler works, rolling mills, bridge shops and for general use where hydraulic presses are required. The bulletin is well-illustrated and contains the usual data tables, code words, etc.

CHAIN.—The Hayden-Corbett Chain Co., Columbus, O., has issued catalog No. 3, devoted to its line of chain and chain forgings. This concern operates three large plants, which have a total capacity of 700 tons of finished chain per month. The line manufactured is very extensive and includes chain for every ordinary purpose; in addition, the company produces special chains according to specifications. A testing machine was recently installed for testing finished chain. This has a capacity of 300,000 pounds and has been tested and certified to by Lloyds Association, London, and approved by the United States government.

ELECTRO-PLATING DYNAMOS. — The Munning-Loeb Co., Matawan, N. J., manufacturer of electro-plating and buffing apparatus and supplies, has issued a bulletin devoted to its line of belt and motor-driven electro-plating dynamos. It is claimed for these dynamos that they will maintain a constant voltage from no load to 25 per cent overload, thus insuring a uniform metallic deposit at a constant rate; it is claimed also that due to the liberal use of copper in the windings, it is possible to work all of the conductors at a low current density and to keep the heat losses at the lowest possible limit.

TRIPLEX POWER PUMPS.—A bulletin issued by the Deane Steam Pump Co., Holyoke, Mass., is devoted to that concern's line of triplex power pumps of the vertical, double-acting type. The advantages claimed for this pump are simplicity, durability, accessibility and solidity of design, and also the practical uniformity in quantity and pressure of the combined discharge from the cylinders. The pumps listed range from 2 x 3 inches to 13 x 12 inches in size of cylinders, and from 11½ to 2,475 gallons per minute in capacities. They are arranged for either belt or gear drive. Dimension tables, capacities, speeds, etc., are included in the bulletin.

FIRE BRICK.—The Pyro Clay Products Co., Oak Hill, O., has issued a handsomely-illustrated, two-color catalog, devoted to its fire brick shapes. The company's plant is located near Oak Hill in southern Ohio in the famous Portsmouth and Ashland fire brick district. The catalog contains an interesting description of the successive processes of fire brick manufacture. The company's various brands are described and the purposes for which they are used are explained. The illustrations, on a reduced scale, are mechanically correct and contain the dimensions of all of the shapes manufactured by the Pyro Clay Products Co. Interesting data on fire brick are included, as well as a number of useful tables.

STEEL.—Schrock & Squires, 291 Pearl street, New York, N. Y., agents for Edgar Allen & Co., Ltd., Sheffield, Eng., have issued a very artistic, compact catalog on the line of high grade crucible steels which they handle. This line includes oil-hardening steels, die steel, tool steel discs, machinery and soft steel, spring steel, coppered Bessemer rods, hollow drill steel and numerous other kinds of tool steels for various purposes. The catalog, however, is mainly devoted to discussion of the various methods of hardening, tempering and otherwise treating these steels and considerable information is included which is not otherwise readily available. The book will prove of undoubted value to those users of high grade steels who are interested in up-to-date descriptions of case-hardening, pack-hardening, hardening in lead pot furnaces, the proper annealing of high speed steel, case-hardening in a cyanide pot furnace, hardening of high speed steel in barium, coloring case-hardening and other processes.

FANS.—"Conoidal" fans, manufactured by the Buffalo Forge Co., Buffalo, are described in a 48-page catalog, recently issued. This type of fan derives its name from the prevalence of conical shapes in its design. The inlet is conical, the blast wheel forms the frustrum of a cone and the blades are curved over the tapering surface of a cone. The advantages claimed for this fan are in its design which insures great structural strength and rigidity. The suction, it is claimed, produced at the inlet of multiblade fans, tends to draw the air in almost at right angles to the back or drive side. Striking the plate, the air is suddenly deflected at an angle of 90 degrees toward the blades and outlet. This abrupt change of direction causes loss of power and velocity. In the design of the "Conoidal" fan means have been provided for counteracting these tendencies, thereby securing an increased efficiency. Blades are narrow at the front, providing a large and unobstructed intake. They increase in width toward the back, causing part of the air to be taken up by them before striking the hub. The hub is made conical to gently deflect the air toward the blades, without loss of power. The inner side of the blades at the back meet the base of the cone, taking up the air at a slow speed because of the small diameter. To offset this slower speed, the blade is made wide at the back, increasing the pressure. The width of the blade decreases toward the front where its higher velocity produces a greater suction. The fan is particularly adapted for heating and ventilating installations.

Thin-Lined Blast Furnace Construction

By David Baker[1]

The operation of the thin-lined blast furnace in this country has not been so successful as in Germany, where the idea originated, and it seems to the writer that this is due principally to the greater loss of heat resulting from the American construction. In this country, three different forms of construction have been adopted, represented first by the furnace in the Isabella group of the Carnegie Steel Co., Pittsburgh, namely, a rolled plate shell cooled by water troughs or pockets riveted to the shell. This furnace is provided with a 12-inch fire brick lining and there is about an inch of metal between the bricks and the water in the pockets.

At South Chicago, the shell of the first thin-lined furnace consisted of

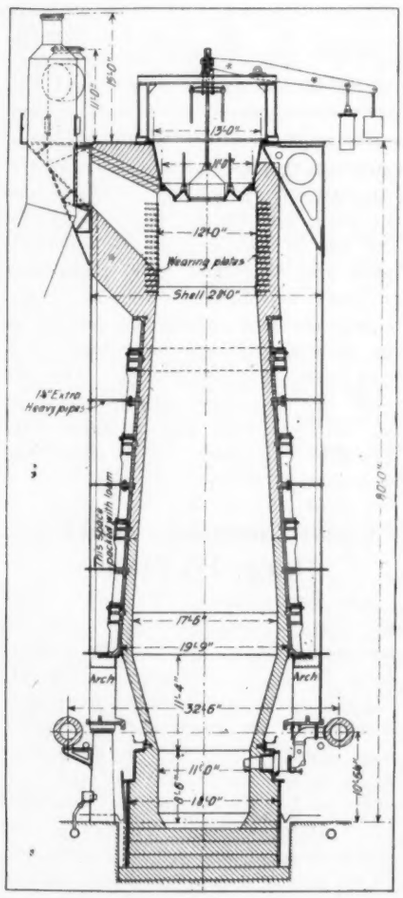


FIG. 1—SECTION OF OLD STACK ARRANGED FOR THIN LINING

cast steel segments bolted together. On the outside of this, the cooling was effected by water flowing over the surface. A second furnace was built at South Chicago of rolled plate construction with water pockets attached, much the same as in the Isabella furnace, except that the water

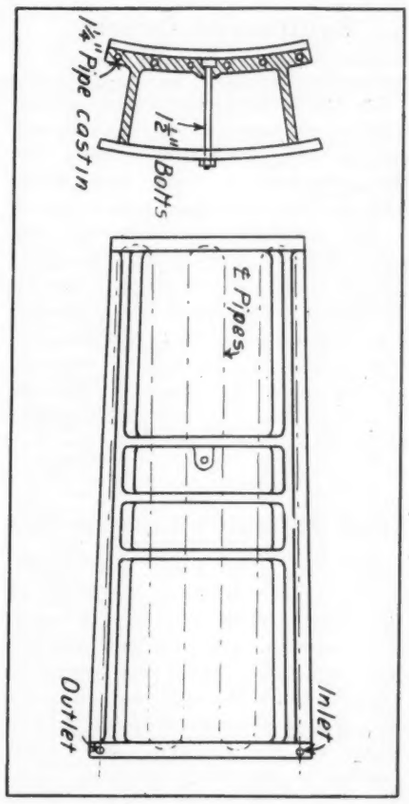


FIG. 2—FRONT VIEW AND SECTION OF COOLING STAVES

instead of circulating from one pocket to another, is kept in the pocket and allowed to evaporate, enough water being added to take the place of what is vaporized.

At the plant of the Tennessee Coal, Iron & Railroad Co., Ensley, Ala., the thin-lined furnace, recently constructed, has a rolled steel shell, 1⅛-inch thickness and cooled by water sprays, so there is a uniform film of water flowing down the outside surface of the shell.

All these forms of construction differ from the German type that has been so successful in having a comparatively thin metal plate between the cooling medium and the brickwork, while in Germany the furnace shells are constructed of heavy cast iron segments, cooled on the exterior. The effect of this difference in construction is to materially increase the loss of heat in the American furnace over what is lost in the operation of the German type.

There is another objection to the rolled plate construction of this country, where the cooling pockets are riveted to the shell, and that is, the danger of leakage, particularly around the rivets or bolts holding the angle irons attached to the inside of the shell, especially where the heads of these rivets or bolts are submerged in the water pockets. In the Ensley construction this danger of leaks from rivets submerged in the water pockets is avoided, but the cooling effect on the whole furnace is greater.

There is no question but that thin-lined furnace construction has come to stay, but just what thickness and what cooling will give the best results, has not been demonstrated conclusively in this country.

The old furnaces with their very heavy fire brick walls, were not only very expensive to reline but, on account of the lack of proper cooling, invited the rapid destruction of the lining by permitting the brickwork

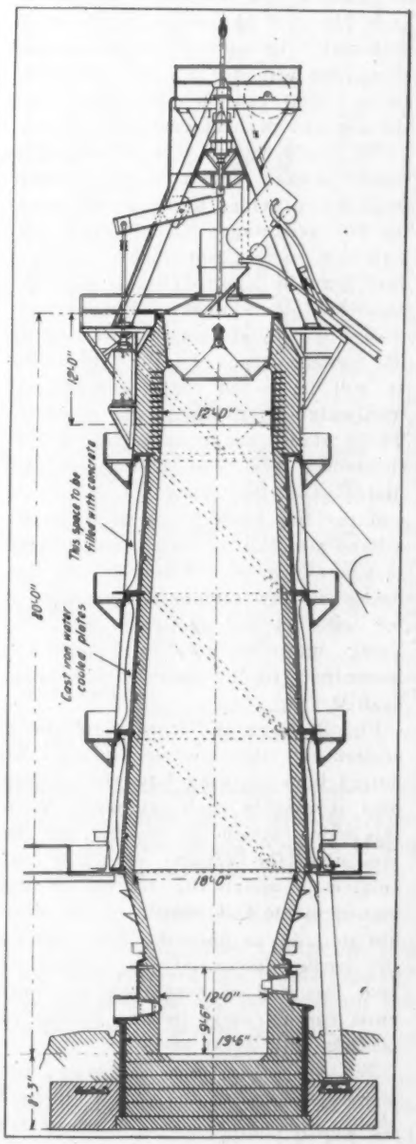


FIG. 3—IMPROVED CONSTRUCTION APPLIED TO A NEW FURNACE SHELL

[1]Consulting metallurgical engineer, 1011 Chestnut street, Philadelphia.

with its very heavy backing of non-conducting material, to reach the temperature of the furnace at that point.

One great obstacle in the way of the general adoption of this new construction to most iron manufacturers, is the cost of replacing the old furnace shell with the new construction and the risk that the change may not prove as satisfactory as anticipated. Whenever a furnace is built for a thin lining, it must be practically rebuilt to return to a comparatively thick lining, if the venture does not prove a success.

What is needed, therefore, is some construction that will permit the owner of one stack to change from a thick to a thin lining without reconstructing the shell, or to permit him to reduce the thickness of the lining in stages as the furnace is relined for each blast, if he wishes to do it in that way. In addition, some cooling should be provided for the thin-lined furnace that can be controlled as to the amount of heat removed.

The Ladd & Baker improved, thin-lined furnace construction, recently patented, provides a means of securing the advantages of thin-lined construction with controllable cooling, that may be applied to an old furnace shell, as well as to a new stack.

In Fig. 1, a section is shown of an old furnace arranged for a thin lining. It will be noted that vertical, cast iron water-cooled staves are provided. These staves are constructed in sections, the first row resting on the mantel and the thrust of the stock and the fire brick lining is taken by a band which girts each section. With this arrangement not only may a thin lining of any thickness be arranged for with an old shell, but the thin lining may be used for only the lower part of the in-wall, if it is so desired.

Fig. 2 shows the front view and a section of the cooling staves, the dotted lines showing how the cooling pipe is cast in each segment. With this construction it readily can be seen that the amount of water circulated is under the control of the management and may be run very hot or cold, as desired. This permits the cutting down of the amount of heat lost and of measuring the heat units carried away in this system of cooling with great accuracy.

Fig. 3 shows this improved construction applied to a new furnace shell. In this case the thrust of the stock and the lining is borne by the shell.

In both applications of this thin-lined construction, the space back of the cooling staves is filled with loam or granulated slag.

Equipment Orders Numerous

The T. H. Symington Co., manufacturer of railroad supplies, reports the receipts of orders recently for the equipping of more than 40,000 railroad cars. Contracts just closed include equipment for 20,000 cars for the Buffalo, Rochester & Pittsburgh, the Missouri Pacific, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Louisville & Nashville, the Norfolk & Western, the Baltimore & Ohio, the Norfolk Southern, the Erie and the Atlantic Coast Line.

Steel Probably Lost at Sea

The freight steamship Moldegaard, which recently went on the rocks at Cat Island along the Florida coast, is reported to be a total loss, together with her cargo, which includes about 5,000 tons of finished steel products in course of shipment from the United States to the Panama canal. This tonnage was made up of plates, fabricated steel and other material, which were being shipped by the American Bridge Co., the McClintic-Marshall Construction Co., Jones & Laughlin Steel Co. and other steel interests for Panama canal requirements.

Receivers' Report. — Receivers George R. Young and Dixon Boardman, of the Platt Iron Works Co., Cincinnati, filed their final report on Dec. 23 with United States Judge Hollister. The receivers served from July 25, 1911, to Nov. 20, when trustees were appointed. According to the report, the value of the plant is fixed at $1,688,374. The court was asked to fix a fee ranging from $17,811 to $22,900, as compensation for the services rendered by the two receivers. In their report, the receivers state that during their tenure of office, they operated the plant and gave steady employment to the 700 employes.

George Z. Hosack has tendered his resignation as vice president of the Pittsburgh Coal Co., Pittsburgh, effective Jan. 1. Mr. Hosack and other Pittsburgh capitalists will organize a new company with a capitalization of $250,000, to develop 1,700 acres of coal land in Washington county, Pa.

CUBAN DEPOSITS

May Be Vigorously Worked as Result of Furnace Leasing.

Philadelphia, Dec. 26.

The announcement that negotiations are now in the final stages for the perpetual leasing of the furnaces of the Warwick Iron & Steel Co., by the Eastern Steel Co., makes it an interesting probability that the Cuban ore holdings of the Eastern company will be vigorously worked in the event of the completion of this deal, which seems assured. These holdings are located on the north coast of Cuba in the Mayari district, which is now being extensively worked by the Pennsylvania Steel Co. The Eastern Steel Co. has held these properties for several years, but has done no extensive development work upon them, as it has not had any blast furnaces under its control. Recently a trial lot of Mayari ore was purchased by the Warwick Iron & Steel Co. and experiments were conducted as to the desirability of the ore for the purposes of such a consumer as the Eastern Steel Co. These experiments have been a part of the negotiations carried on between the Warwick and the Eastern companies. The use of this ore by the Pennsylvania and Maryland Steel companies in steel making practice has been quite extensive in recent years and the results produced have been of a very high order of quality. The ore is of the Bessemer grade, about 45 per cent in iron, and contains considerable chromium. It is also high in moisture.

Hoist Company Will Enlarge Its Plant

The International Hoist Co., Antigo, Wis., a consolidation of the International Hoist Co. and the Pioneer Iron Works, of Antigo, is marketing $20,000 worth of treasury stock preliminary to the erection of new buildings and purchase of new equipment. It is proposed to buy at least six acres to provide for the proposed new plant and for future extensions. October business amounted to more than $4,500 and November business exceeded $5,250.

Welsh Tin Plate Trade

Swansea harbor trust returns for the week ending Dec. 9, with comparisons, follow:

	Boxes. Recd.	Boxes. Shipped.	Boxes. Stocks.
Week Dec. 9.....	94,074	74 820	88,123
Previous week	105,150	169,814	68,769
Same week last year.	100,657	80,276	185,547

Prices on the New York stock exchange moved irregularly throughout all of last week. The receivership of the Wabash railroad was followed by a break which extended to all of the Gould securities.

Monday, the market was less active and reactionary, prices, with the exception of Lehigh valley, closing about 1 per cent lower. Tuesday, the stock market rallied sharply in the late dealings under the leadership of Steel common; foreign security markets were dull and heavy. Wednesday, the market was dull and barely steady; copper securities advanced on the further rise in the price of the metal; grain markets were lower. Thursday, the list was dull but steady, with the exception of copper securities, which were strong on a further advance in the price of the metal, and Louisville & Nashville, which declined 2½ points. Friday, the list continued dull but steady, Lehigh Valley, the exception, furnishing one-fourth of the entire business of the day. Saturday the exchange was closed for the holidays.

Money on call ranged between 4 and 3 per cent. Time money continued at the same rates, with demand somewhat broader. The actual condition of clearing house institutions showed loans increased $10,283,000; net deposits increased $20,030,000; total reserve, $397,952,000; and the excess of reserve $11,138,300, a decrease of $4,489,100. Non-member banks and trust companies show loans decreased $1,782,900; net deposits increased $229,500; reserve on deposits increased $317,900, and the percentage of reserve, 18.7, against 18.9 the previous week. Bank clearings for the week showed a decrease of 3.4 per cent from the previous week, but an increase of 6.5 per cent from the corresponding week last year. Commercial failures numbered 322, against 345 the preceding week and 294 the corresponding week last year. Shares were sold to the number of 1,974,900, compared with 3,235,600 the previous week and 1,418,180 the corresponding week last year. Bonds, exclusive of government bonds, were sold to the amount of $21,881,000, compared with $22,017,000 the previous week and $12,178,000 the corresponding week last year.

	Clos'g Quo. Dec. 23	Changes in week.	Annual Meeting date 1911		Stock Outstanding	Basis.	Dividend Last Dividend	Date Last Div. Pay
Allis-Chalmers	1⅜	.....			$19,820,000		.....	
Allis-Chalmers, pr	8⅝	+1			16,050,000	7 cum.	1¾ Q.	Feb., 1904
American Can	10¾	— ¼	Feb.	1	41.233,300		1¾ Q.	
American Can, pr	89⅝	— ½			41,233,300	5 cum.	1¼ Q.	Jan., 1912
Am. Car & Fdy	54	— ½	June	29	40,000,000		½ Q.	Jan., 1912
Am. Car & Fdy., pr	117⅛	+ ⅛			30,000,000	7 n. c.	1¾ Q.	Jan., 1912
American Loc	36¼	— ¾	Oct.	17	25,000,000	5	1¼ Q.	Aug. 1908
American Loc., pr	104	.....			25,000,000	7 cum.	1¾ Q.	Jan., 1912
American Ship	50	+ ½	Oct.	11	7,600,000	4	2 Q.**	June, 1911
American Ship, pr	103	—2			7,900,000	7 n. c.	1¾ Q.	Oct., 1911
Am. Steel Foundries	33½	+ ½			17,184,000		1¼ Q.	May, 1911
Barney & Smith	15	.....	June	6	2,000,000	4	1 Q.	Dec., 1907
Barney & Smith, pr	70	.....			2,500,000	8 cum.	2 Q.	Dec., 1911
Bethlehem Steel	30⅜	+⅝	April	4	14,862,000		.....	
Bethlehem Steel, pr	60⅛	+1⅜			14,908,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	44½	— ¼	Mar.	21	45,000,000*	5	1¼ Q.	Nov., 1911
Cambria Iron	44½	+ ⅛			8,468,000*	4	2 S. A.	Oct., 1911
Chicago Pneumatic Tool	46½	.....	Feb.	20	6,448,800	4	1 Q.	Oct., 1911
Colorado Fuel	27½	—1¼	Oct.	16	34,235,500		1¾ Q.	April, 1902
Crucible Steel	13¼	+1¾	Oct.	18	24,578.400			
Crucible Steel, pr	83	+1⅛			25,000,000	7 cum.	1¾ Q.	Dec., 1911
Empire Steel	6	.....	Feb.	22	1,254,770		.....	
Empire Steel, pr	40	.....			2,500,000	6 cum.	2 S. A.	July, 1911
Fay & Egan	70	.....	Feb.	21	1,000,000	6 cum.	3 S. A.	Feb., 1911
Fay & Egan, pr	110	.....			1,000,000	7 cum.	1¾ Q.	Nov., 1911
General Electric	155	— ½	May	9	77,281,200	8	2 Q.	Jan., 1912
Harbison-Walker	40	.....	Jan.	16	18,000,000		½ Q.	Dec., 1911
Harbison-Walker, pr	99	.....			9,600,000	6 cum.	1½ Q.	Oct., 1911
International Pump	33¼	.....	Dec.	12	17,762,500		1 Q.	Nov., 1910
International Pump, pr	83	— ½			11,350,000	6 cum.	1½ Q.	Nov., 1911
Lackawanna Steel	30	.....	Mar.	4	34,978,000		.....	
Lake Sup. Corp	26½	—1¼	Oct.	4	40,000,000		.....	
New York Air Brake	56	.....	Mar.	8	10,000,000	6	1½ Q.	July, 1911
Niles-Bement-Pond	94	.....	Feb.	8	8,500,000	6	1½ Q.	Dec., 1911
Niles-Bement-Pond, pr	104	.....			2,000,000	6 cum.	1½ Q.	Nov., 1911
Otis Elevator Co	71½	+1½	Mar.	20	6,375,000	4	1 Q.	Jan., 1912
Otis Elevator Co., pr	96	.....			6,375,300	6 n. c.	1½ Q.	Jan., 1912
Pa. Steel	60	.....	May	8	10,750,000		.....	
Pa. Steel, pr	102½	.....			16,500,000	7 n. c.	3½ S. A.	Nov., 1911
Pittsburgh Coal	18⅛	— ⅛	Feb.	10	28,104,600		.....	
Pittsburgh Coal, pr	83	+ ⅛			27,071,800	7 cum.	1¼ Q.	Oct., 1911
Pittsburgh Steel Co., pr	101	—1½	Oct.	31	7,000,000	7 cum.	1¾ Q.	Sept., 1911
Pressed Steel Car	33⅞	+ ⅝	Feb.	15	12,500,000		1 Q.	Aug., 1904
Pressed Steel Car, pr	100	.....			12,500,000	7 n. c.	1¾ Q.	Nov., 1911
Pullman	159½	+2	Nov.	8	120,000,000	8	2 Q.	Nov., 1911
Railway Stl. Spring	30¾	—1⅛	Mar.	2	13,500,000	2	1 S. A.	Oct., 1908
Railway Stl. Spring, pr	98½	.....			13,500,000	7 cum.	1¾ Q.	Dec., 1911
Rep. Iron & Steel	27⅝	+2¼	Oct.	18	27,191,000		.....	
Rep. Iron & Steel, pr	84¾	+ ¾			25,000,000	7 cum.	1¾ Q.	Jan., 1912
Sloss-Sheffield	42¼	.....	Mar.	15	10,000,000	5	1¼ Q.	Sept., 1910
Sloss-Sheffield, pr	112	.....			6,700,000	7 n. c.	1¾ Q.	Jan., 1912
U. S. Pipe & Fdy. Co	16	.....	June	28	12,500,000		1 Q.	Dec., 1910
U. S. Pipe & Fdy. Co., pr	51	+1			12,500,000		1¼ Q.	June, 1911
U. S. Steel	68½	— ⅛	April	17	508,302,500	5	1¼ Q.	Dec., 1911
U. S. Steel, pr	111½	+ ¼			360,281,100	7 cum.	1¾ Q.	Nov., 1911
U. S. Steel 5s	101⅞	+ ⅛			463,798,000	5	.....	
Va. Iron, Coal & Coke	69	—2¼	Sept.	19	9,073,680		5. †	Oct., 1907
Westinghouse Electric	67½	—1¼	July	26	3,998,700*		1¾ Q.	Jan., 1912
Westinghouse Air Brake	154	.....	Oct.	3	14,000,000*		5 Q.‡	Jan., 1912

Par value of shares, $100, except those starred (*), $50.
**Includes last 1 per cent payment of 4 per cent extra.
†Stock.
‡Includes 2½ regular, 1½ extra and 1 special.

Copper Stocks.

New York.—Amalgamated Copper closed 66⅝, a net gain of ¼.

Boston.—Butte Coalition closed 22⅞, a net gain of 3⅛; Calumet & Arizona closed 63¼, a net gain of 3½; Calumet & Hecla closed 438, a net gain of 16; North Butte Mining closed 29, a net gain of 2⅞; Quincy Mining closed 74, a net gain of 4.

Financial Notes.

The Westinghouse Electric & Mfg. Co. has declared the regular quarterly dividend of 1¾ per cent on preferred stock, payable Jan. 15.

The National Radiator Co., Johnstown, Pa., has let contracts for the construction of additions to the foundry and core room of its Trenton, N. J., plant. Estimated cost, $10,000.

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THE AVERAGE PAID CIRCULATION OF THE IRON TRADE REVIEW FOR THE ISSUES OF THE FOLLOWING MONTHS WAS:

January, 1911	6,058
February	6,072
March	6,091
April	6,108
May	6,112
June	6,124
July	6,138
August	6,152
September	6,161
October	6,172
November	6,186

December 28, 1911

Must Not Be Enemies

In Cooper Union, New York, a few evenings since, W. D. Haywood, who was accused of the dynamiting to death of ex-Governor Steunenberg, of Idaho, and was tried under conditions which made conviction impossible, made a speech in which he lauded the acts of violence in Idaho and Colorado, declaring himself an out-and-out "direct actionist", pleaded for violence as a weapon of the working class and urged upon the Socialists an open declaration of an intention to organize for armed warfare. Haywood's speech was delivered under the auspices of the Socialist party and the following are a few of the sentences from it:

Can you wonder that I despise the law? I understand the class struggle. I am not a law-abiding citizen. More than that, I do not believe you here ought to be law-abiding citizens.

The McNamara boys who went to San Quentin out of Los Angeles know what the class struggle means. They knew and for that reason my heart is with them.

Let us Socialists be frank. We want to overthrow the capitalist system and establish in its place an industrial democracy. Why then say we are law-abiding?

I believe in coercion. Every trade union believes in coercion. But I would have this game of coercion played on so large a scale that it would be irresistible instead of sporadic, as it now is.

Could anything be more repugnant than these sentiments of Haywood to this glorious holiday season of peace and good will and to the sentiments of the great masses of people whether they be called workingmen or not? Could anything be more utterly out of harmony with the teachings of Peter Cooper, the great philanthropist and lover of mankind, for whom Cooper Union was named? In contrast with these sentiments of the lawless Haywood, we commend the words of the immortal Lincoln, uttered at the close of his first inaugural address:

"WE ARE NOT ENEMIES, BUT FRIENDS. WE MUST NOT BE ENEMIES. THOUGH PASSION MAY HAVE STRAINED IT MUST NOT BREAK OUR BONDS OF AFFECTION."

Terrible as was the Civil war, with its destruction of life and property, even more awful would be a struggle between employers and employes. Every dictate of conscience, every demand of enlightened self interest, every requirement of public welfare, demands that employers and employes be friends. They must not be enemies. The anarchistic teachings of such a man as Haywood must be counteracted by earnest reasoning and just methods. There is not and there must not be class struggle in this country.

Industrial Activity Measured by Iron and Coal

The rate of iron producton is commonly regarded as an excellent index of the general business activity of the country. It is a fact, however, that iron production has sharp ups and downs and it is really the measure of commercial or business activity rather than of industrial activity in general. There are great waves in the production and consumption of iron, due to special bursts of activity in new construction, as of bridges and buildings, cars and locomotives and the like. Quite obviously the number of railroad cars built in different years constitutes no true index of the amount of freight handled. The number of cars bought is rather a measure of the prospects of increase in the freight business which railroad managers expect. On the other hand, the coal consumed by railroads would prove a very accurate index of the amount of passenger and freight business they were currently conducting.

As a guide to business conditions and prospects, iron is an excellent index, and it is for that reason that it was long ago dubbed the "barometer of trade", the function of a barometer being to foretell what is about to occur. The number of postage stamps sold, on the other hand, would constitute a fairly trustworthy thermometer of trade, for postage stamps are not bought ahead, but are bought currently according to the amount of industrial activity.

The production of coal furnishes an index to industrial activity of no little importance. Even its domestic consumption varies with industrial depression or activity. Its consumption by railroads, a very large item, varies according to the amount of freight and passenger business conducted, and in general in manufacturing industries the consumption varies with the activity. It is, therefore, a contribution to general knowledge which the *Coal Trade Journal* makes when it publishes a preliminary estimate of the coal production in the United States in 1911. Its figures indicate 90,000,000 short tons for anthracite, a gain of 6,000,000 tons over 1910, and 425,000,000 short tons for bituminous, a gain of about 7,000,000 tons over 1910, and making a total of about 515,000,000 net tons. This figure, of course, is only approximate, but is undoubtedly sufficiently accurate to prove that a new tonnage

record has been made, there being nearly 15,000,000 tons leeway, since the output in the record year, 1910, as officially reported by the geological survey, was 501,576,895 net tons.

Pig iron made no such record in 1911, the output falling short of the output in four previous years, 1906, 1907, 1909 and 1910, and falling short of the record year, 1910, by about 13 per cent. Our estimate for the year is 23,650,000 gross tons. This is reached by taking our monthly furnace reports for July to November inclusive, setting December down for a production at the same rate as November, and adding 150,000 tons for the half year's production by the charcoal furnaces. This gives 11,968,433 tons for the last half year, the production in the first half having been officially reported at 11,665,796 tons. Adding an odd 16,000 tons to bring out even figures and to allow for a slight increase in December production, despite possible slow running in the holidays, makes a total for the year of 23,650,000 tons.

In order to compare coal and iron production in 1911 with that of previous years and also to study the variations between coal and iron, we have constructed the following table, which shows for the past 11 years the coal production in net tons, the pig iron production in gross tons, and the number of net tons of coal to gross tons of pig iron:

	Coal. Net tons.	Pig iron. Gross tons.	Coal to pig iron.
1901	293,299,816	15,878,354	18.5
1902	301,590,439	17,821,307	16.9
1903	357,356,416	18,009,252	19.8
1904	351,816,398	16,497,033	21.3
1905	392,722,635	22,992,380	17.1
1906	414,157,278	25,307,191	16.4
1907	480,363,424	25,781,361	18.6
1908	415,842,698	15,936,018	26.1
1909	460,803,416	25,795,471	17.9
1910	501,576,895	27,303,567	18.4
1911	515,000,000	23,650,000	21.8

In 1904, both iron and coal receded, but the coal recession was negligible, while the iron recession was marked. In 1907, coal made a very great gain, while iron made only a slight gain. Both suffered thereafter, but differently, iron having a much greater recession in 1908 than coal, but iron recovered in 1909, while coal did not. In 1911, coal made a new record, while iron fell far behind. The honors are not so unevenly distributed, but coal has somewhat the better of it. Comparing 1910, which was a record year in both coal and iron, with 1901, there was a 71 per cent gain for coal and a 72 per cent gain for iron. Thus far, by this method of comparison, they broke even, but next year, 1911, coal gained and iron lost.

By comparing the number of tons of coal per ton of pig iron, it may also be observed that coal and iron ran closely together, there being usually a trifle more than 18 tons of coal per ton of iron. In the "off" years for iron, the proportion went up, and in 1908, a decidedly "off" year for coal, but a year in which iron was almost altogether off, the proportion ran particularly high. In 1911, again we find the proportion high, a trifle higher than in 1904, an ordinarily off year.

We may thus conclude that in industry in general 1911 was not an off year, but in iron it was an off year.

The consumption of coal in direct connection with the manufacture and use of iron is very large. In 1909, for instance, when 460,803,416 tons of coal was produced, nearly 60,000,000 tons was used in the manufacture of coke, much more than half of which was used in making pig iron. In heating steel for rolling, and in the generation of power for iron and steel works, another large tonnage of coal is used, and taking account also of the use of coal in the further fabrication of iron and steel products, it is evident that a very large tonnage is consumed. Therefore, when iron production decreased so much in 1911, while coal production increased, it is evident that the coal used otherwise than in connection with the manufacture and fabrication of iron increased very greatly.

Too Much Politics? — The Riter-Conley Mfg. Co., Pittsburgh, is suing the Snare & Triest Co., contractors, to recover $90,000 for an alleged breach of contract in connection with the furnishing of riveted pipe for the Catskill aqueduct. It is charged by the plaintiffs that the contract was originally given to them, but that through political interferences it was transferred to the T. A. Gillespie Co. The defendants declare a formal contract was never entered into.

British Steel Rebates Are Threatened

The rebate question is still causing much heartburning, and merchants have placed large quantities of orders abroad, says our Birmingham, Eng., staff correspondent. But they can only do this over a very narrow range of descriptions, and they are quite likely, shortly, to yield to the inevitable. At the same time, it is likely that manufacturers will so far meet their objections as to remove certain conditions, which are strongly resented by the merchants.

The merchants in Scotland go so far as to threaten to test in the law courts the rebate proposals, from the point of view of their illegality in the way of restraint of trade. Meanwhile, an endeavor is being made to further extend the system of combine agreement by the re-establishment of the tube trade amalgamation which a few years ago was carried out with considerable success.

Dock Improvements at Escanaba

More extensive repairs than had been expected are to be made to the Escanaba ore shipping piers of the Chicago & Northwestern railroad this winter. The entire upper portions of both docks No. 3 and No. 6 are to be rebuilt. It has been decided to demolish the No. 1 dock and put it out of commission permanently. This pier is an antiquated structure. It is the intention eventually to erect on the site of the No. 1 dock or of the No. 2 dock a reinforced steel pier costing in the neighborhood of three-quarters of a million dollars or more. The expenditure of the Northwestern at Escanaba this winter will approximate $100,000. Important improvement work also is to be carried on by the Chicago, Milwaukee & St. Paul at its North Escanaba dock. Repairs costing $30,000 are to be made by the Northwestern at its No. 1 dock at Ashland.

The New York, New Haven & Hartford Railroad Co. will hereafter operate its Hartford, Conn., shops on the old schedule of nine hours a day. For nearly four years the working day has averaged seven and eight hours.

The Diets Machine Co., Bloomington, Ill., advises that it has given up the idea for the present of erecting a new building.

WITH DEEP INTEREST

Operations at The Kloman Mining Property Are Being Watched.

Old range mining men in general and the fee owners of low grade ores in particular are watching with interest the progress of the work conducted by the John T. Jones interests at the Kloman property in the Republic field of the Marquette district. It is at the Kloman that the furnace of which the Iron Mountain metallurgist is the inventor, and which is designed to metallize mineral-bearing material now practically worthless, is to be put to commercial use for the first time. It is expected that production will be started on a small scale shortly after the first of the year.

Operations have been in progress at the Kloman for more than a year past. The work has included the erection of substantial, concrete buildings, the installation of furnace plants and machinery and the exploration and development of ore-bearing ground. The last of the mechanical equipment is now being placed in position and the underground workings—wrought many years ago—are being unwatered. Prior to commencing operations, the Jones interests made a thorough test of Kloman ore at their experimental furnace at Iron Mountain. The subsequent heavy expenditures are taken as an indication that the results were wholly satisfactory.

Associated with Mr. Jones are John M. Longyear, millionaire land and mine owner of Brookline, Mass., and Marquette, Mich., and a number of prominent Lake Superior iron mining men. The company expects to prove conclusively that its furnace can treat low-grade ores at a profit in normal markets. The inventor and his associates have been working on the plant in Iron Mountain the past several years, making changes as experience suggested, and they believe they have brought their investigations and practice to a point where they can confidently claim to have overcome all former difficulties.

Some men skilled in the manufacture of steel are skeptical as to the outcome of this invention, claiming there is nothing new connected with it, and they feel certain that the cost of production will be higher than will be warranted by the market prices for the treated metal. On the other hand, the invention has many friends who believe it will prove a pronounced success and be invaluable in its treatment of the low-grade ores of the Lake Superior districts, of which there is an enormous tonnage. The plants at Republic are an improvement over the one at Iron Mountain, embodying all the principal features of the latter as well as important additions.

Lectures on Prevention of Accidents

William H. Doolittle, of Cleveland, who is employed as factory inspector for the prevention of industrial accidents by the Metal Trades Association, gave an illustrated lecture concerning his work, at the Cleveland Young Men's Christian Association, Dec. 20. Mr. Doolittle showed by stereopticon views and explained many safety devices used today by manufacturing plants for the protection of their employes, and gave some statistics showing that workmen can be greatly benefited by them, still, he said, there are approximately 35,000 deaths directly due to industrial accidents in the United States in a year, and 500,000 are either killed or injured. Most of these accidents are caused, however, from the carelessness of the workmen themselves, and it is a general rule that employers are more anxious to install safety devices than the men are to use them. At the annual convention of the Metal Trades Association, which was held in New York last summer, Mr. Doolittle was also appointed to devise a plan for a systematic compensation for industrial accidents.

Locomotive Orders.—The Chicago & Northwestern railroad has placed an order with the American Locomotive Co. for 75 locomotives, including 45 consolidation freight locomotives, 15 Pacific type passenger locomotives and 15 switch locomotives. It is announced that the New York Central railroad has placed an order with the American Steel Foundry for 17,000 car couplers for equipment of cars recently placed.

The John Boyle Co., Baltimore, has placed an order for two complete lines of automatic can-making machinery manufactured by Slaysman & Co., Baltimore. This will make seven complete lines in all of Slaysman machinery which that concern has installed.

North Butte Mining Co. has declared quarterly dividend of 30 cents per share, payable Jan. 20.

CAR SHORTAGE

Declared to be a Serious Problem.—Troubles of the Railroads.

Testifying on behalf of the complainant in the pending demurrage suit brought against the Michigan Railroad Commission by the Michigan Central and other interested lines, Andrew H. Green Jr., manager of the Solvay Process Co., Detroit, declared the present shortage of cars one of the most serious problems confronting our commercial interests.

This shortage he explained was due to the railroads not having built enough cars to keep pace with the rapidly increasing traffic. "The railroads," he contended, "have been held down by financial conditions and have been unable to borrow sufficient money to build and extend in keeping with larger traffic requirements."

Mr. Green added that the railroads of the country must look for their support and maintenance to the business interests, and insisted that these same interests must understand that for their own good the railways must be equipped adequately. He expressed the belief that a general advance in traffic rates should be made, if found necessary to give the railroads a reasonable return on their investments.

The Newport Mine.—It is the understanding in the Gogebic district that the Newport mine at Ironwood, a property of Ferdinand Schlesinger, of Milwaukee, will be restored to a normal operating basis early in January. The Newport is the biggest individual producer on the range, employing more than 1,500 men when wrought to capacity, for which reason the reported decision to operate as heavily as before the policy of retrenchment was adopted is cheery news to the people of the community. The working forces were practically cut in half last spring. Since that time, however, important surface construction work has been carried on and much underground development has been in progress.

Building New Plant.—Ground has been broken for the erection of a new plant for the Lanston Monotype Co., at Twenty-fourth and Locust streets, Philadelphia. The plans provide for a six-story concrete and brick structure, 77 x 276 feet, with a wing, 45 x 109 feet, to cost $200,000. Wm. Steele & Sons Co., Philadelphia, have the general contract.

INCREASE STOCK

Of L. S. Starrett Co. to $3,500,000.—Nine Directors Chosen.

The L. S. Starrett Co., Athol, Mass., manufacturer of mechanical tools, has recently increased its capital stock to $3,500,000, of which $1,500,000 is to be 6 per cent cumulative preferred stock and $2,000,000 common stock. The company was incorporated in 1900 with a capital stock of $100,000, succeeding the business established in 1880 by L. S. Starrett, who still continues at its head. The officers of the company are: President, L. S. Starrett; vice president, F. A. Ball; secretary and treasurer, F. E. Wing, and assistant treasurer, W. G. Nims. The board of directors has been increased from five to nine, and is composed of the above officers, and M. B. Waterman, A. P. Loring, J. A. McGregor, J. H. Drury and W. B. McSkimmon. The last named four are officers of the Union Twist Drill Co., also of Athol, which recently became a stockholder in the Starrett company.

Baldwin Locomotive Works Statement

The Baldwin Locomotive Works, in applying for the listing of its $20,000,000 preferred stock on the Philadelphia stock exchange, has submitted the balance sheet showing total assets as of Oct. 31, 1911, of $54,341,869. In comparison with the balance sheet of Dec. 31, 1910, submitted to the New York stock exchange at the time of the listing of a large issue of first mortgage bonds, the assets increased $12,397,858. The balance sheet of the Standard Steel Works, a subsidiary, showed comparatively small changes in that period.

Who Pays the Taxes.—At Ishpeming, Marquette range, the mining companies, the value of whose properties the state tax commission some weeks ago largely increased, will this year pay exactly 90 per cent of the total tax levy. This percentage is materially larger than ever before, the figure the past few years having ranged between 65 and 75 per cent. The tax roll foots up $279,394. Of this sum, the Cleveland Cliffs Iron Co. will pay $124,540, the Steel Corporation $100,995 and the Jones & Laughlin Steel Co., $11,605. The levy on all other property in the city is $42,254. The rate is $1.86 per $100 valuation. The Salisbury mine, an Ishpeming property of the Cleveland Cliffs company, is out of commission at present, pending repairs to the shaft. It will resume operations about the first of the year. The mine employs a force of 150 men.

DEPLORABLE EFFECT

On American Trade Will be Caused by Abrogation Act.

Milwaukee, Dec. 23.—In the opinion of members of the export department of the J. I. Case Threshing Machine Co., of Racine, Wis., the abrogation of the Russian treaty will have a deplorable effect on American trade in the czar's domain. Especially in the farm machinery distribution field will the action be felt, as Russian wheat fields are supplied practically by American farm machinery manufacturers. The tariff war that is expected to result may turn all of this business into English and German channels, they say, and the only alternative for American builders will be to establish factories in Russia, which is considered an expensive and unsatisfactory proposition.

Copper Products Advanced

The price of copper sheets has been advanced 1c per pound, thus making the base price of sheets 19c. Copper bottoms have been advanced to 24c, and the tinning price has also been raised ½c per square foot, to 3½c per square foot. These advances, which are due to the increased cost of copper and tin, were effective Dec. 20.

Wll Rebuild Shop.—The Lehigh Valley Structural Co., Allentown, Pa., whose plant was recently damaged by fire, has decided to rebuild its shop at that location.

"SKF Radial Bearings" is the title of a bulletin just issued by the S. K. F. Ball Bearing Co., 50 Church street, New York. This bulletin explains the construction peculiarities, particularly the provision for self-alignment, of SKF radial bearings, and gives dimensions, speeds and capacities of the principal types and sizes.

Samuel P. Adams, formerly a Harbison-Walker district works manager, and before that connected with the Portsmouth & Kentucky and Portsmouth Fire Brick companies, has been engaged as a sales manager by the Pyro Clay Products Co., Oak Hill, O.

LARGE RAIL ORDERS

Received by Dominion Steel Corporation, Aggregating 150,000 Tons.

Toronto, Can., Dec. 23.—President J. H. Plummer, of the Dominion Steel Corporation, states that the company has received an order from the Canadian Pacific railway for 42,000 tons of steel rails and has now in hand orders for 150,000 tons of rails in all. The rod mill is busy with sufficient orders in hand to enable them to run day and night until June next. The entire steel output for some time to come should run to 30,000 tons per month, barring accidents.

President T. J. Drummond, of the Lake Superior Corporation, who has returned from a trip of inspection to Sault Ste. Marie, says that the rail mills are running to full capacity, but that the merchant mills are running light, owing, he claims, to the dumping of American products in Canada at prices, in some cases, below the cost of production.

Crucible Steel Statement

The quarterly statement of the Crucible Steel Co. of America, for the period ending Nov. 30, shows net profits of $729,710, as compared with $664,245 for the same period in 1910, an increase of $65,464.

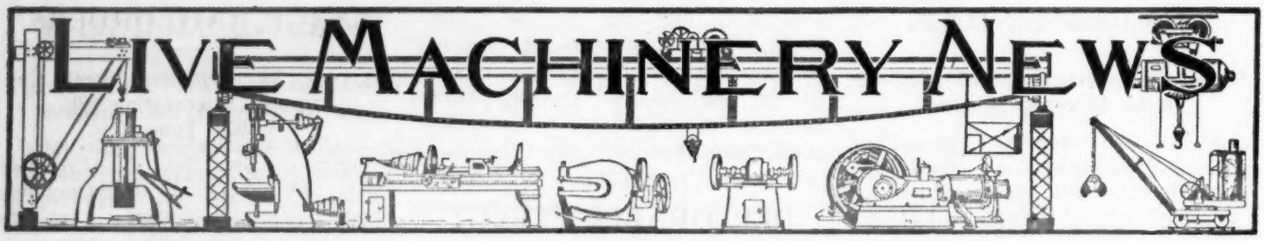
The American Hollow Steel Sash Co., Philadelphia, incorporation recently noted, will manufacture a one-piece steel window sash of hollow frame construction. The company has leased a factory at Aramingo and Tioga streets, Philadelphia. The officers are: President, G. W. Brownyard, and vice president and treasurer, R. W. Tunnell.

Lease Recommended

Directors of the Warwick Iron & Steel Co. have voted to recommend the lease of the company's blast furnaces to the Eastern Steel Co. for 99 years, on an 8 per cent basis.

The Oklahoma City, Okla., board of education has just closed a contract for $10,830 for machine shop equipment to be used in the manual training high school at that place.

The Pittsburgh & Lake Erie Railroad Co. has asked for bids on a new station to be erected at Aliquippa, Pa. The building will be 24 x 90 feet.



In Pittsburg, although little of interest has transpired in machinery circles during the past week, the trade in general is inclined to believe that business will improve shortly after the first of the year. A large amount of new construction work which has been held up during the year is expected to be contracted for shortly. A number of railroads in the Pittsburgh district are also seriously considering their machinery replacements. In New York, several lists which have previously been announced as being in the preparatory stage are expected to appear shortly. All indications seem to point toward marked improvement in the New York machinery market during the first quarter. In Cleveland, there is little reason to expect any marked change in conditions in the near future. Machinery sales continue to average about 60 per cent of normal in that market. In Chicago, December business, compared with previous years, has been very satisfactory, and 1911 has not been a bad year in spite of generally slow conditions.

Machine Tools

The state prison commission, Frankfort, Ky., is in charge of the purchase of equipment for the new manual training department of the state reformatory at Lexington, Ky. A machine and wood-working shop are to be equipped.

A machine shop is being equipped by the Tennessee Auto Co., Nashville, Tenn., which has secured a permit for the construction of an addition to its building. The cost of the building will be $3,000, and about the same amount will be spent for new tools.

The Louisville railway, Louisville, Ky., has commenced the improvement of a 10-acre tract at Thirtieth street and Broadway in Louisville, which was secured sometime ago and on which will finally be erected the repair shops of the company. The first building to be erected will be 100 x 400 feet and will be devoted to machine shop purposes.

Water Works

A waterworks may be constructed by the municipality of Benton, Ky. The purpose of the plant will be chiefly fire protection.

The city of Phoenix, Ariz., has appropriated the sum of $18,000 for extensions to its municipal water system.

Burns & McDonnell, Kansas City, are preparing plans and specifications for new waterworks at Winnemucca, Nev. A valuation of the privately owned water and lighting plant is also being made.

The Bakersfield Water Co., Bakersfield, Cal., has acquired the plant and system of the Sumner Waterworks Co., operating in East Bakersfield. The company will enlarge and improve the plant. New equipment will be installed. W. R. Williams is head of the company.

Bids will be received by the board of water trustees, B. F. Stedman, superintendent, Dubuque, Ia., until Jan. 22, 1912, for the construction, delivery and erection of a double-acting motor-driven, duplex pump, with a capacity of 2,000,000 gallons per day. This machinery is to be installed at the Level pumping staton.

Power Plant Equipment

The Spokane & Inland Empire R. R. Co., Spokane, Wash., is in the market for one 500-kilowatt motor-generator set.

Manchester, Ga., has declared in favor of the issuance of bonds to provide for the erection of a modern electric light plant.

The Southern Electric & Traction Co., Walsenburg, Colo., is about to commence work on the construction of a power plant to cost $75,000.

The city of Boulder, Colo., expects to construct a municipal electric light plant at some future date, but only preliminary work is being done at the present time.

An emergency power station is to be built by the Nashville, Tenn., Railway & Light Co. Equipment is to be purchased at once, as the building is to be built early in the new year.

A power plant, consisting of a boiler, engine and pump, will be installed by the Audubon Mineral Water Co., which was recently organized at Maysville, Ky.

An electric compressor will be installed at the pumping station of the water plant by the city commissioners, Montgomery, Ala. The estimated cost of the new equipment is $16,000.

The Timken Roller Bearing Co., Canton, O., is taking bids, through the Osborn Engineering Co., Cleveland, for the construction and equipment for a 700-kilowatt power plant.

The Charles R. McCormick Lumber Co., San Diego, Cal., will build a new planing mill, boilers and dryer plant. The buildings, for which a permit has been issued, will cost $12,000.

D. M. Vesey and W. E. Mossman, Angola, Ind., have incorporated the Angola Light & Power Co., with a capital of $50,000 and expect to construct a plant for the generation and sale of electricity.

The International Mines Development Co., Chloride district, Ariz., operating the George Washington mines, plans for the installation of new operating machinery, and power drills. E. E. Peck is general manager.

The erection of an electric light plant is contemplated by the Big Sandy Electric Co., of Catlettsburg, Ky., which has been incorporated with $5,000 capital stock by C. W. Poling, F. F. Fisher and S. B. Wannock.

Power equipment, as well as special crushing and grinding machinery will be purchased by the Tennessee Cotton Oil Mills Co., which is to begin work at once in rebuilding its plant, recently burned. John Meyers is vice president of the company.

The Great Falls Power Co., Nashville, Tenn., which is considering the erection of a hydro-electric power plant at Great Falls, Caney Fork river, is completing surveys and will be ready to determine its plans in the near future.

The board of county supervisors, Los Angeles, will receive bids up to Jan. 15, for vacuum cleaning machinery, boilers, refrigerating plant, and

heating and ventilating machinery, to be installed in the county hospital. H. J. Lelande is clerk for the board.

The Cleveland Electric Illuminating Co., Cleveland, has asked permission from the state public utilities commission to issue $1,500,000 in new capital stock and the same amount in bonds. Additional machinery will probably be installed at the new Lakeside power plant and other improvements will be made.

A 10-story reinforced concrete manufacturing building will be erected at the corner of Locust and Twenty-third streets, St. Louis, by Henry Leschen. Six passenger and seven freight elevators will be required and a power plant will be installed to furnish power for manufacturing purposes.

The city clerk, Two Harbors, Minn., is taking bids on a 300-kilowatt, 60-cycle, single or double phase unit for installation in the lighting plant. Bids will also be considered for a direct-connected engine and generator, also for rope or pulley driven generator; the engine in the latter case should be a condensing engine.

Bids are being taken on new buildings and equipment for the new plant of the Cross Creek Coal Co., Burgettstown, Pa., which include a new tipple; powerhouse, 50 x 100 feet; boilers of 1,200-horsepower; coal picker; stokers; electric generators for mine haulage and operation; fan and ventilating plant; pumps; motors; railway and mine trackage and electric mining machinery.

The Crawford Locomotive & Car Co., Streator, Ill., advises that it has let a contract to the Decatur Bridge Co., Decatur, Ill., for the enlargement of its power house. An extension will also be erected which will be used as a forge department and machine shop. The power house now contains 500-horsepower boiler capacity and the additional space is to permit of the installation of 500 additional horsepower.

New Construction

The Galion Iron Works Co., Galion, O., plans to erect an addition, 60 x 150 feet.

The Hydraulic Press Mfg. Co., Mount Gilead, O., has completed arrangements for building a new brass foundry.

The Vrooman Co., San Francisco, will build a new foundry plant on Folsom street. A contract for the erection of the building has been awarded.

The Hamilton Bridge Works Co., Hamilton, Ont., has had plans prepared for the erection of an addition at a cost of $30,000.

The Kissel Motor Car Co., Hartford, Wis., has increased its capital stock and is erecting an addition to double its capacity.

The National Brake & Electric Co., Milwaukee, which recently increased the capacity of its plant, contemplates further improvements next year.

The Baker Mfg. Co., Evansville, Wis., will build a four-story, concrete warehouse, 96 x 126 feet, next spring at its Fort Dodge, Ia., branch.

The Christopher & Simpson Architectural Iron & Foundry Co., St. Louis, will shortly erect an addition to one of its shops. The cost will be approximately $15,000.

The Chalmers Motor Car Co., Detroit, has under construction a two-story brick and steel building, 75 x 180 feet. It will be used for final inspection and shipping.

A stove foundry is to be established at Roanoke, Va., by K. A. Coppridge, whose present address is Richmond, Va. Details of the plan have not yet been announced.

The International Hoist Co., Antigo, Wis., plans to erect additions to its plant. It is now marketing securities, the proceeds to be used in purchasing a tract of six acres.

Bertsch & Co., Cambridge City, Ind., manufacturer of punches, shears and bending rolls, will receive bids within the next two weeks on its proposed new buildings.

The Heppenstall Forge & Knife Co. is erecting an addition to its plant in the Lawrenceville district, Pittsburgh, which will more than double its capacity.

The Bagley & Sewall Co., Watertown, N. Y., manufacturer of paper and pulp-making machinery, advises that it contemplates an addition to its machine shop.

Announcement is made by directors of the Baldwin Locomotive Co. that a branch plant will be built in Chicago, to care for the western business. The management is now seeking a site in that city.

The North Buffalo Hardware Foundry, Buffalo, has leased a tract from the Standard Foundry Co., that city, and will proceed to erect a foundry, 66 x 230 feet, adapted for machine molding of light gray iron castings.

The Smith Foundry Co., Ltd., Fredericton, N. B., has begun the erection of a new plant to replace its buildings recently burned. Electrically operated machinery will be installed throughout.

The National Biscuit Co., Oakland, Cal., has had plans prepared by W. F. Wilmoth, architect, 409 West Fifteenth street, New York, for the erection of a large steel frame distributing plant at Oakland.

The Imperial Co., Independence, Kas., manufacturer of electric washing machinery, has moved its plant to Tulsa, Okla. The plant will be in operation in the new location on Feb. 1.

Equipment is being purchased by the Cleveland Foundry & Machine Works, Cleveland, Tenn., which has filed articles of incorporation with $20,000 capital stock. The incorporators are C. A. Horner, R. P. Sullivan, G. T. Denton and others.

The Strong Steel Foundry Co., Buffalo, advises that it has in the course of construction a new fireproof pattern vault, 50 x 50 feet, two stories, for which contracts have all been let. The company will not commence the construction of its larger buildings before next spring.

The Santa Fe Railway Co., Kerckhoff building, Los Angeles, has awarded contracts for the erection of roundhouses at Riverbank and Calwa, Cal., each with a capacity of 15 stalls. The company is also taking bids for the erection of a new 25-stall roundhouse at Barstow, Cal.

Smith, Hinchman & Grylls, 710 Washington Arcade building, Detroit, are preparing plans for a two-story fireproof, gray iron foundry, to be erected at Battle Creek, Mich., for Nicholls & Shepherd. The plant is expected to cost $35,000 and the building will be 90 x 305 feet.

A contract for fabricating and erecting an extension to the hammer shop at the plant of the American Car & Foundry Co., at Chicago, has been let to the McClintic-Marshall Construction Co., for which 497 tons of structural steel will be required. Some new power transmission machinery will be installed.

The Union Tool Co., Los Angeles, manufacturer of oil well machinery, tools, etc., is said to have signed a contract for the erection of a new and extended plant near Dominguez, a few miles from Los Angeles, early in 1912. The company has a site of 25 acres; the plant is estimated to cost $350,000.

The Amalgamated Motors Co., Los Angeles, recently incorporated with a capital of $500,000, has acquired the Durocar Mfg. Co., Los Angeles, manufacturer of automobiles. The company has obtained a site near Santa Ana, Cal., and plans for the erection of a large plant for the manufacture of pleasure cars and motor trucks.

The Worcester Pressed Steel Co., Worcester, Mass., is erecting a foundry, 21 x 31 feet, of steel construction,

to be used for manufacturing high grade iron and steel castings for dies and die beds. For this building a cupola, etc., will be required. The company will also erect a new office building, the space now occupied by the offices to be added to the tool and die-making department.

Miscellaneous

The Brown Bear mine, near Dowieville, Cal., plans for the installation of a hoisting plant.

W. S. Bradford, Phoenix, Ariz., will install a full equipment of machinery to operate his placer mines in the Copper Basin district, Ariz.

The Farmers' Loose Leaf Tobacco Warehouse Co., Carlisle, Ky., is in the market for hydraulic presses to be used in packing leaf tobacco.

The Washington Tin Plate Co. has awarded a contract to the Westinghouse Electric & Mfg. Co. for 16 motors for the addition to its plant at Washington, Pa.

The Alloys Steel Forging Co. has placed an order with the Skinner Engine Co. for a 100-horsepower engine, direct-connected with generator, to be installed at Braeburn, Pa.

A used three-ton steam hoist, mounted on trucks, is to be purchased at once by the Nashville-Gallatin Interurban railway, Stahlman building, Nashville, Tenn.

The Plymouth Foundry & Machine Co. was awarded a contract for equipment for the proposed addition to the power plant at Plymouth, Wis., amounting to $3,000.

The Verdi Lumber Co., Verdi, Nev., plans for the construction of a logging railroad to a point near timber properties at Sattley, Sierra county, Cal. The line will be about 15 miles in length.

L. W. Farmer, of Barbourville, Ky., manager of the Harlan Coal Co., which is preparing to develop a large acreage of eastern Kentucky coal lands, is about ready to begin buying coal conveyors, power machinery, etc.

Contracts have been placed by the Whittaker-Glessner Co., Wheeling, W. Va., for six new patent Bailey combination sheet and pair furnaces for its plant at Martins Ferry, O., to be installed by George J. Hagan, Pittsburgh.

The Pittsburgh Crucible Steel Co. has placed an order with the Green Engineering Co., Pittsburgh, for stoker equipment for a battery of nine 600-horsepower Sterling boilers to be installed in the power plant of the new steel works at Midland, Pa.

Some contracts have been awarded for equipment for the new plant of the Warren Tool & Forge Co., Warren, O. The general contract for the erection of the building was placed with the Pittsburgh Bridge & Iron Works, Pittsburgh, some time ago. The building will be 75 x 225 feet.

Thomas B. Davis Jr., 1 Broadway, New York, is general manager of the Pond Creek Coal Co., Boston, which is beginning development work in eastern Kentucky. The company has completed surveys and will shortly begin the erection of tipples and the construction of power plants for the operation of mines.

The Menominee & Marinette Light & Power Co. has awarded the following contracts for new equipment for the power plant at Ingalls, Mich.: Generator, General Electric Co., Chicago office; water wheel and accessories, Dayton Globe Iron Works Co., Dayton, O., and transformers, switchboards, etc., Westinghouse Elecric Co., Chicago office.

Government News

Bids were opened by the bureau of supplies and accounts, navy department, Dec. 19, for furnishing materials and supplies for delivery at the various stations named, in accordance with the schedules and classes enumerated, as follows:

Schedule 4132, class 119, Brooklyn, 8 trolley hoists for torpedoes, 3,000 capacity: Burrows Sloan & Co., Washington, $54; The Fairbanks Co., Washington, $113.82; R. W. Geldart, Baltimore, $107; Montgomery & Co., New York, $112.50; Manhattan Supply Co., New York, $110; Yale & Towne Mfg. Co., New York, $113.84; Manning, Maxwell & Moore, New York, $111.15.

Schedule 4115, class 65, Charleston, 1 double surfacer with six rolls, 30 by 7 inches: Berlin Machine Works, Beloit, Wis., $1,432; Chicago Machinery Exchange, Chicago, $925; J. C. Fay & Egan Co., Cincinnati, $1,064.

Sealed proposals will be received at the office of the United States reclamation service, Boise, Ida., until 2 o'clock p. m., Jan. 10, 1912, for furnishing four electric derrick hoists and four stiff leg derricks, for the Boise project, Idaho. For particulars address the United States reclamation service, Boise, Ida., or Washington, D. C.

The Strong Steel Foundry Co., Buffalo, advises that it has in the course of construction a new, fireproof, pattern vault, 50 x 50 feet, two stories, to cost approximately $5,000. The contracts have all been let. The company will not commence the erection of the larger buildings of its plant before next spring. These structures are to cover the tract purchased some months ago.

SAFETY DEVICES

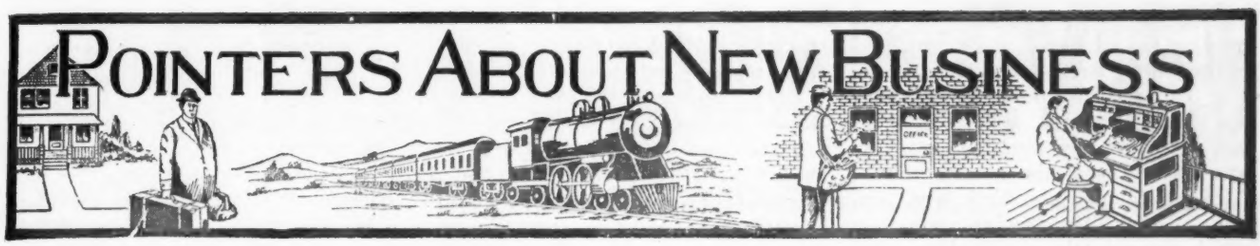
Installed at Heavy Expense by Corporation and Cleveland Cliffs Company.

During the past year, the United States Steel Corporation has expended hundreds of thousands of dollars in the installation of safety devices at its Lake Superior mining properties. Committees of officials and employes were appointed to conduct thorough investigations and to report to the various district superintendents just what work precautionary against accident should be undertaken. The various recommendations made have since been carried into effect or are in progress of adoption. Where the work has been completed, the engine house plants, the machines in workshops and the equipment and the workings in general are so thoroughly safeguarded that it is almost impossible for an employe to receive an injury, except because of his own carelessness. The Cleveland Cliffs company also has had committees at work, engaged in devising plans for safeguarding the men employed at the various plants of the corporation on the Marquette range. Wm. G. Mather, of Cleveland, president of the company, has instructed the officials to spare no expense in providing the necessary equipment. The committees have partially completed their reports and as far as possible the various recommendations will be put into effect during the winter months. Safety devices will be installed, both underground and on surface, and particular attention will be paid to the shafts, where, as a rule, more fatal accidents occur than in any other portion of mine workings.

A drill, manufactured from vanadium steel produced by the American Vanadium Co., Pittsburgh, was recently tested on extremely hard rock along the line of the New York aqueduct. The drill not alone started the hole, but is reported to have drilled two feet.

A nominee to succeed the late Robert Mather as chairman of the Westinghouse Electric & Mfg. Co., was not recommended at the recent meeting of the board of directors.

The Duquesne Steel Foundry Co. is erecting a three-story brick and reinforced concrete addition to its plant at Coraopolis, Pa.



(In order to assist the post office in delivering letters to new concerns, it is suggested that the names of incorporators be written in the lower left hand part of every envelope addressed to such new companies.)

New Buyers

The following manufacturing companies have filed articles of incorporation:

The Muncie Ornamental Iron Works, Muncie, Ind.; $10,000; by C. W. Hanika and John and Clara B. Fitzgibbons.

The Wilson Gin & Machine Co., Jackson, Miss.; $10,000; by W. D. Wilson, J. F. Spillyard, E. J. Anderson.

The Springfield Compressed Air Co., Springfield, O.; $100,000; to manufacture air compressors; by L. C. Keyser, J. H. Jenkins, J. D. Gierhart, O. M. Martins and J. P. Goodwin.

The Fidelity Machine Mfg. Co., Philadelphia; $25,000; to manufacture textile and special machinery; by J. J. Higginbottom, 2021 East Huntington street.

The Cleveland Foundry & Machine Works, Cleveland, Tenn.; $20,000; by C. A. Horner, D. D. Tripett, J. C. Ramsey, G. T. Denton and R. P. Sullivan.

The Miami Machine Co., Parkersburg, W. Va.; $200,000; by P. P. H. Conover, G. L. Camden, Simms Powell and H. P. Camden, of Parkersburg, and James Turpin, Dayton, O.

The Kentucky Check Row Corn Planter, Bowling Green, Ky.; $25,000; to manufacture corn planters; by Martin E. Thomas, Elmer Carter, Milt Taylor and W. O. Rodes.

The Penn Motor Car Co., Camden, N. J.; $500,000; to manufacture automobiles, motor vehicles, etc.; by V. A. Murray, L. A. Meyers, Doering Bellinger.

The Long Island Iron & Steel Co., Brooklyn, N. Y.; $50,000; to manufacture and deal in iron and steel; by J. E. Whitney, New York; B. D. Leich, Brooklyn, etc.

The Williams Steel Wheel, Rim & Tire Co., Wilmington, Del.; $1,000,000; by William E. Williams, Chicago; H. L. Drullard, Verona, N. J., and J. H. Thain, New York City.

The Royal Automatic Machine Co., Brooklyn, N. Y.; $10,000; to manufacture stove pipes, other pipes, machinery; by Sydney Solomon, Celia Rothenstein, Louis R. Brodsky, all of 502 Broadway, New York City.

The E. B. Andes & Co., Lancaster, Pa.; $10,000; to manufacture patterns, machinery and other articles made from iron and steel, etc.; by Eugene B. Andes, Harry Urlass and William S. Gleim, all of Lancaster.

The Siegfried Motor Co., Borough of Northampton, Pa.; $10,000; to manufacture all kinds of motors, etc.; by Charles A. Porter, John J. Kocher, John Warta and Benjamin R. Debbie, all of Siegfried, Pa.

The Miami Iron & Steel Co., Hamilton, O.; $625,000; to manufacture iron and steel and various products thereof; by E. M. Peters, H. L. Brenneman, Louis A. Ireton, J. C. Thomas and Frank E. Dinsmore.

The Union Electric Welding Co., Toledo, O.; $20,000; to manufacture electrically welded metal tiles; by J. J. Urschell, William Urschell, Frank E. Beam, George Henriche and C. E. Holden.

The General Steel Products & Supply Co., Toledo, O.; $100,000; to manufacture steel reinforced material; by E. J. Marshall, H. W. Fraser, George E. Dixon, J. E. Parsons Jr. and G. M. Roswick.

The Hutchinson Metal Roofing Co., Manhattan, New York City; $150,000; to manufacture roofing, sky lights, etc.; by Harrie C. Manheim, Leo B. Levy, Joseph B. Kalmuk, all of 60 Wall street, New York City.

The Norwich Automatic Feeder Co., Norwich, Conn,; $30.000; to manufacture automatic feeding and watering appliances; by Francis De L. Sullivan, New York, and Henry H. Walker and Frank Enos Jr., of Norwich.

The Atlantic Engine Co., Meadville, Crawford county, Pa.; $10,000; to manufacture gas and gasoline engines, and other machinery; by Frank G. Diffin, John Dick, Joseph McK. Speer and E. Percival Cullum, all of Meadville.

The Fefelle Mfg. Co., Manhattan, New York City; $10,000; to manufacture machinery, etc.; by George H. Hailaman, 4 Sheridan square; Albert H. Fefelle, 120 Henry street, Brooklyn; Rudolph Lenk, 203 West 109th street, New York City.

The Hartsough-Stewart Construction Co., Lake Charles, La.; $300,000; to manufacture rotary ditching machinery; by president, Walter W. Hartsough; vice president, Frank P. Eastman; secretary and treasurer, Frank E. Jones.

The C. V. Stahl Motor Co., Philadelphia; $5,000; to manufacture all kinds of motors, etc.; by John Schanlin, 43 North Virginia avenue, Atlantic City, N. J.; Charles V. Stahl, 2721 Diamond street, Philadelphia; Charles T. Moyer, 2024 North Twenty-second street, Philadelphia.

General Industrial

The Midvale Steel Co., Philadelphia, will hold its annual meeting Jan. 8.

The Hastings Motor Shaft Co., Hastings, Mich., has increased its capitalization from $50,000 to $75,000.

The Brown Machine Co., Lansing, Mich., has been incorporated with $25,000 capitalization.

The Bourne-Fuller Co., Cleveland, has increased its capital stock from $150,000 to $2,000,000.

The Sharp Spark Plug Co., Cleveland, has increased its capital stock from $10,000 to $20,000. J. F. Johnson is president of the company.

The Atwood Wrench Tool & Stamping Co., Conneaut, O., has increased its capital stock from $25,000 to $150,000.

The Riverside Malleable Iron & Steel Co., recently incorporated in Delaware with $150,000 capital, will begin business shortly in Scranton.

The Detroit Switch Lock Co., Detroit, has been incorporated for $25,000, with Albert Kaltzschmidt as principal stockholder.

The Power Multiple Tool Co., Detroit, has incorporated for $20,000, with R. M. Mackenzie as principal stockholder.

The Dallman & Cooper Supply Co., Fond du Lac, Wis., has made a large installation of welding apparatus manufactured by the Oxy-Acetylene Welding Machine Co., Kansas City, Mo.

The Lodge Mfg. Co., South Pittsburgh, Tenn., has completed the construction of its new foundry building

and is turning out grates, sad irons, etc.

The Smith Grab & Tool Co., Galeton, Pa., the incorporation of which was recently noted, advises that it will not build any buildings or install any machinery at the present time.

The Fish Indicator Co., New London, Conn., the incorporation of which was recently noted, advises that it has a plant fully equipped, and that it is manufacturing marine indicators.

The Universal Motor Truck Co., Detroit, is to be reorganized and its output increased, following the purchase of a controlling interest by Howard Walton, of New York City. Heavy trucks are manufactured.

The Kissel Motor Car Co., Hartford, Wis., has increased its capital stock from $400,000 to $1,000,000. The company is engaged in erecting an addition to its factory that will practically double its capacity.

The Osborn Machine Co., Du Bois, Pa., which recently increased its capital stock, reports that it does not expect to make any improvements and that the increase was for the purpose of taking up a floating debt.

The Atlas Gas Engine Co., Inc., Oakland, Cal., manufacturer of gas, gasoline and oil engines, is putting up an entirely new plant at the foot of Twentieth avenue and the water front, that city.

The Pennsylvania Tank Car Co., Pittsburgh, the incorporation of which was recently noted, advises that it has acquired seven acres of land at Sharon, Pa., and is now erecting buildings.

The Cleveland-Copeman Electric Stove Co., Cleveland, advises that it is distributing the Copeman automatic cook stove, which is designed to cook by electricity. It can be regulated by means of a clock, which automatically turns the current on or off.

The Virginia-Tennessee Hardware Co., Bristol, Va.-Tenn., has been sold to James T. Cecil, James F. McCrary and associates, the amount involved being about $150,000. The new company will begin operations about Jan. 1.

The Bessolo Pipe Wrench Co., at Spring Valley, Ill., has begun the erection of a factory building. The company will manufacture a patented wrench. The officers are: President, W. L. Bessolo; vice president, Fred Gunther; secretary, Anton Faletti, and treasurer, C. W. Knapp.

The new plant of the Mount Union Refractories Co., at Mount Union, Pa., is progressing rapidly. All foundations are completed, the building of the kilns is well under way, and the structural steel is being erected. The plant will be of modern fireproof construction.

The Stuyvesant Motor Car Co., Cleveland, has taken over and consolidated with the Grant-Lees Machine Co., also of Cleveland, and a new company has been capitalized at $350,000, to manufacture the Stuyvesant automobile. The company will, however, retain the name of the Stuyvesant Motor Car Co.

The Thomas Pink Co., Ltd., Pembroke, Can., which manufactures lumbering and driving tools, advises that its plant, which was destroyed by fire Nov. 2, has been entirely rebuilt, and is running to its full capacity again. The new building is 95 x 110 feet, one story, and is of brick and wood construction. All machinery needed has been secured.

The Cincinnati Precision Lathe Co., Cincinnati, the incorporation of which was recently noted, advises that it will manufacture single belt drive lathes with rapid change of speeds, doing away with overhead gearing and cross belts. The officers of the company are: President and treasurer, M. H. Stewart; vice president and general superintendent, J. M. Tatman; secretary, Wm. C. Tatman.

A new company, the name of which will be decided later, has been formed at Lebanon, Pa., by W. H. Worrilow and T. C. Quinn, to manufacture steel castings. The entire organization of the Lebanon Steel Casting Co. will also be with the new concern. The two above named incorporators have been connected with the Treadwell Engineering Co., Easton, Pa., and its subsidiary, the Lebanon Steel Casting Co., Lebanon, Pa.

The National Brake & Electric Co., Milwaukee, has increased its capital stock from $1,000,000 to $2,000,000 to cover extensions of its plant already completed or in prospect. The present year's business is reported to be 25 per cent larger than that of 1910. Extensions amounting to $500,000 or more have been made to the plant and more improvements are planned for next year.

Stockholders of the United States Motor Co., at their recent meeting in Jersey City, elected J. W. Stoddard a director in succession to H. J. Edwards. The report for the year ending July 31, last, shows net profits of $2,040,256; interest, $488,065; dividends, $738,411; or total interest and dividends, $1,226,476; balance, $1,098,092, amount written off, $644,344, leaving net surplus for the year $453,748.

The Potter Mfg. Co., Geneva, O., the incorporation of which was recently noted, has been in operation for eight years with W. A. Potter as sole proprietor. Garden tools and hardware specialties are manufactured. The officers of the new company are as follows: President and general manager, W. A. Potter; vice president, John Hasenpflug; secretary, A. M. Ford; treasurer, A. W. Chamberlain.

The Hunsicker Engineering Co., Lebanon, Pa., whose incorporation was recently noted, will operate the works of the Lebanon Mfg. Co. This plant was leased for the past ten years to the M. H. Treadwell Co., which lease will expire Dec. 31. The Hunsicker company proposes to do general foundry, machine and forge work, grinding mills for sand or brick, boiler plate bending rolls, special cars, etc. Its shops are also equipped to do all kinds of blast furnace, rolling mill and open-hearth furnace work. The incorporators are H. H. Boger, R. M. Rhodes, John Hunsicker Sr., John Hunsicker Jr., F. T. Harpel, Charles Haak and Warren G. Light.

Trade Notes

The Howard Iron & Tool Co. has changed its office from Bellefonte, Pa., to Howard, Pa.

The Kerr Turbine Co., Wellsville, N. Y., announce the appointment of the following new agents: St. Louis, Walter L. Flower, 312 So. Eighth street, and New Orleans, C. E. Grevemberg, 1023 Maison Blanche bldg.

The S. K. F. Ball Bearing Co., 50 Church street, New York, has opened an office in Chicago to facilitate the handling of western business. The new office will be in 1505 Heisen building, and in charge of C. A. Winn.

Debevoise-Anderson Co., 95 Liberty street, New York, has been appointed sole agent east of Pittsburgh and Buffalo for washed metal, produced by the Youngstown Steel Co., Youngstown, O. This product is used in the manufacture of very high grade steel castings of all descriptions.

Fires

The Detroit Auto Brass & Machine Co., Detroit, sustained a $1,000 loss by fire, due to defective wiring, Dec. 19.

The electric lighting plant at Sparta, Mich., was destroyed by fire Dec. 20, when the properties of the Sparta Milling Co. and adjacent concerns sustained a loss estimated at $200,000.

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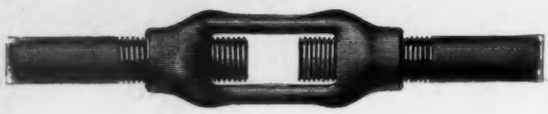

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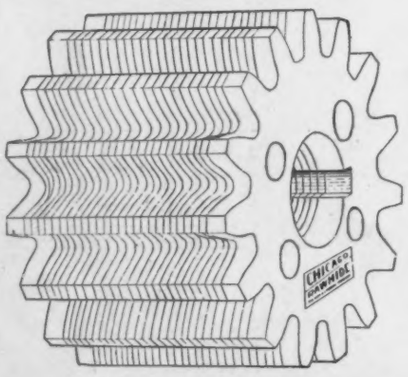

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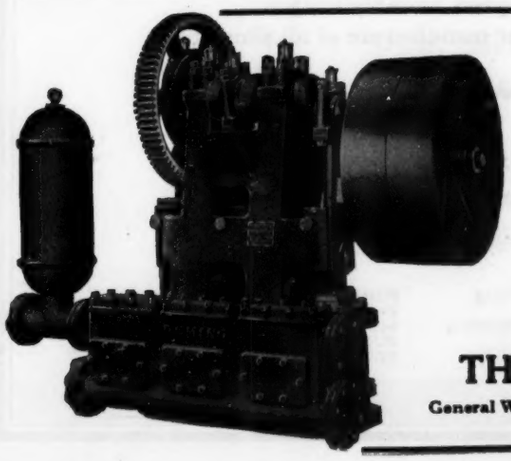

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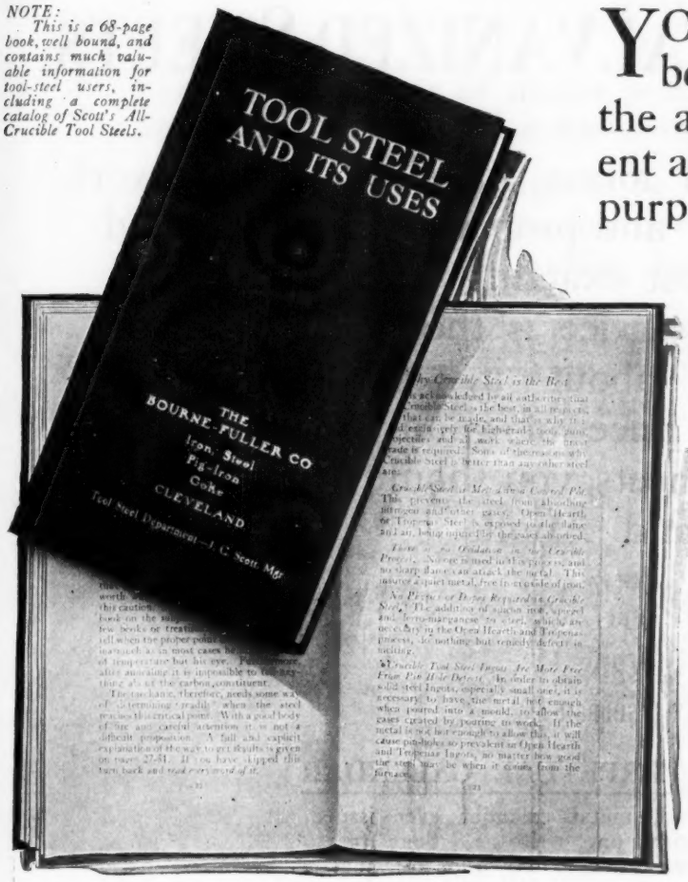

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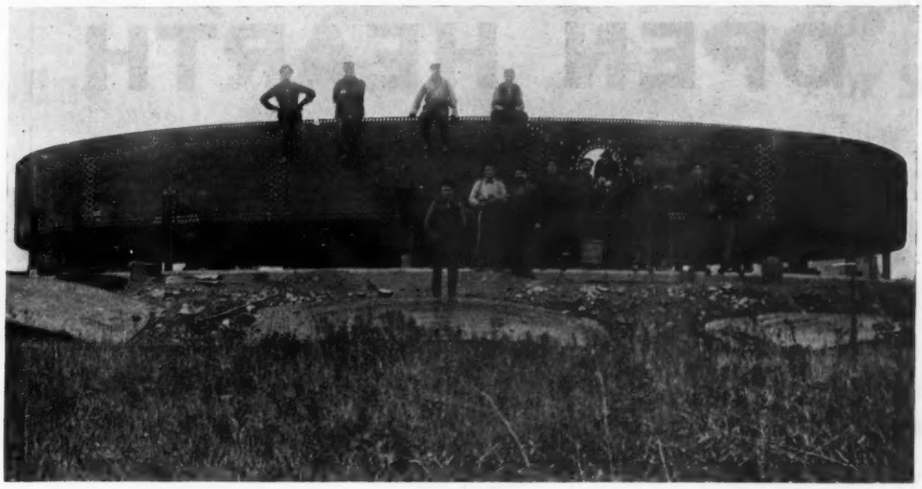

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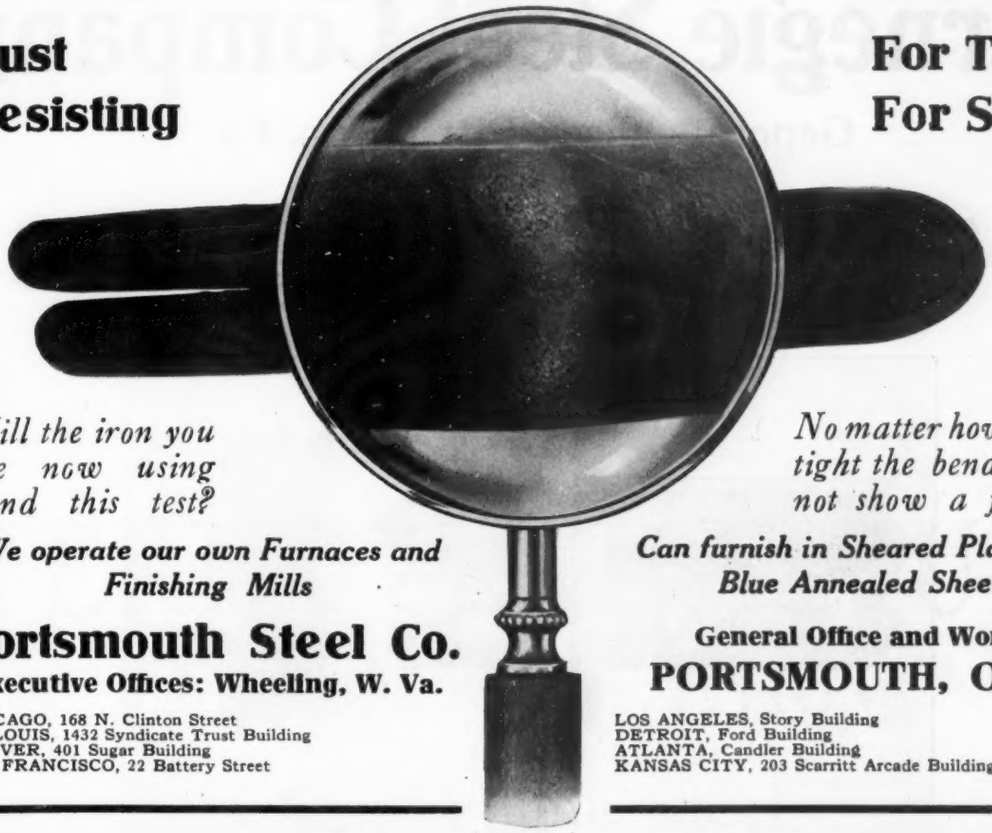
For Tanks For Stacks



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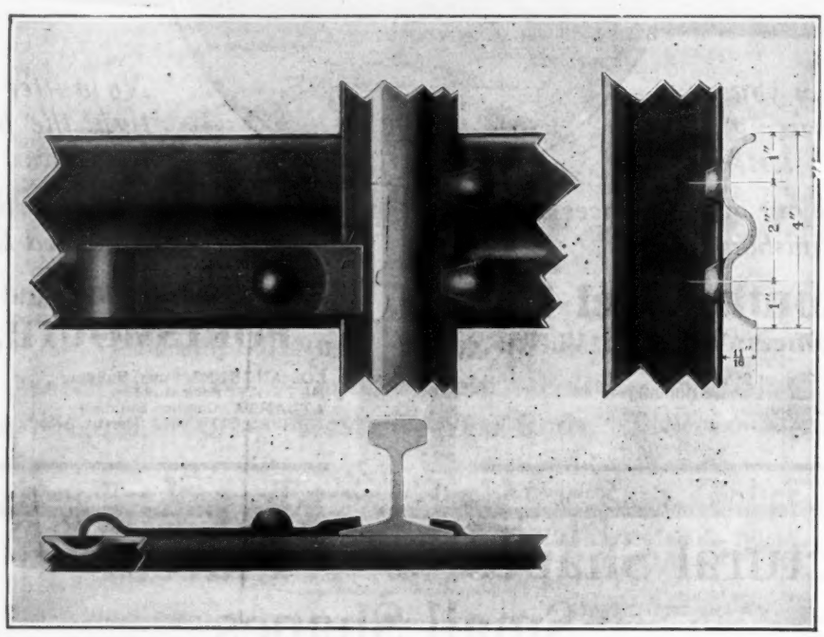

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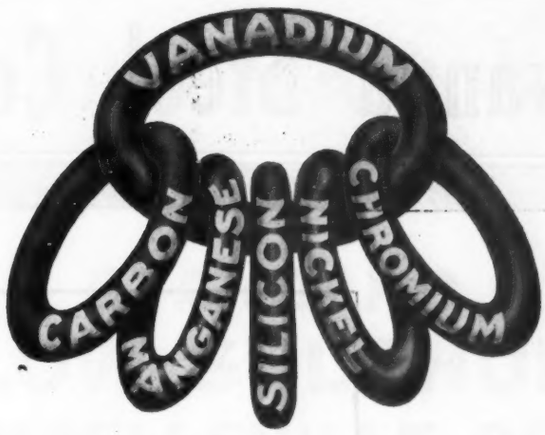

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VANADIUM Steel has been proved to be the best and, ultimately, the cheapest steel for all classes of high duty service, working against shocks, vibrations and fatigue with extraordinary success and endurance. It forges, machines, welds, case-hardens and lends itself to heat treatment as readily as other steels that do not possess its manifold advantages.

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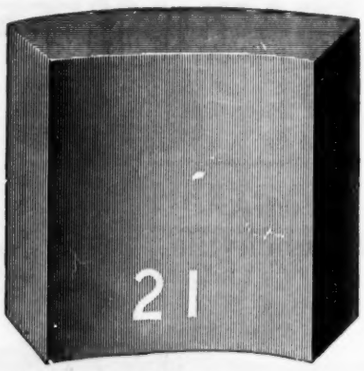

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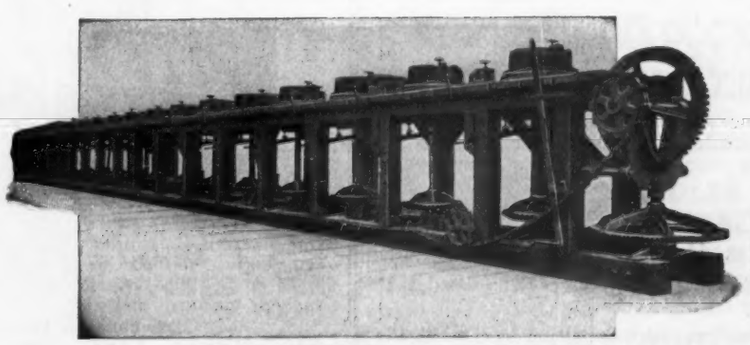

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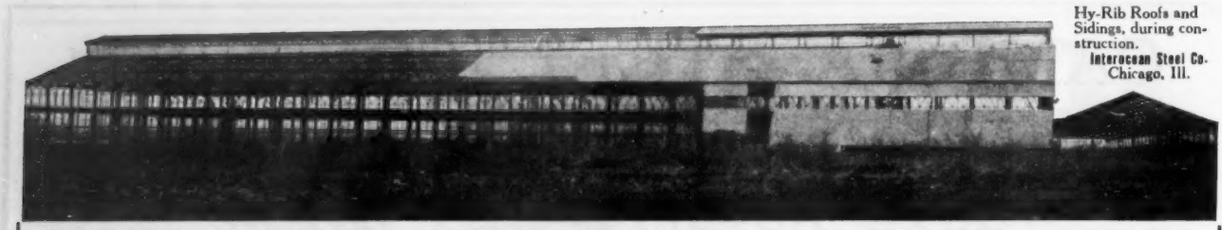

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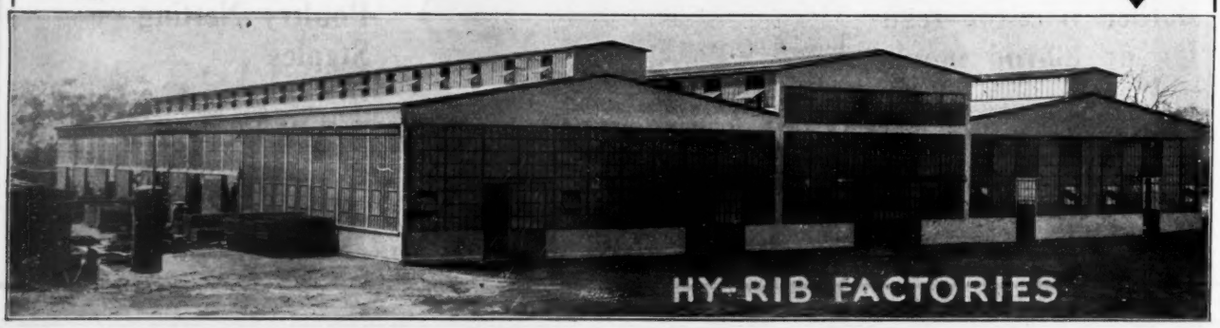

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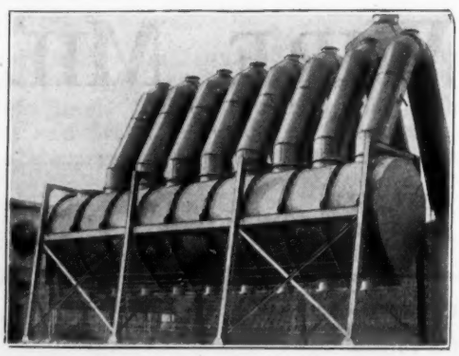

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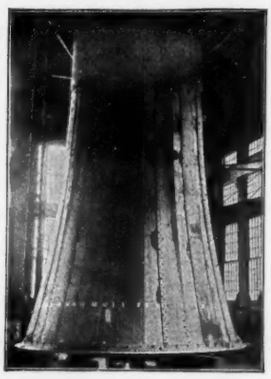

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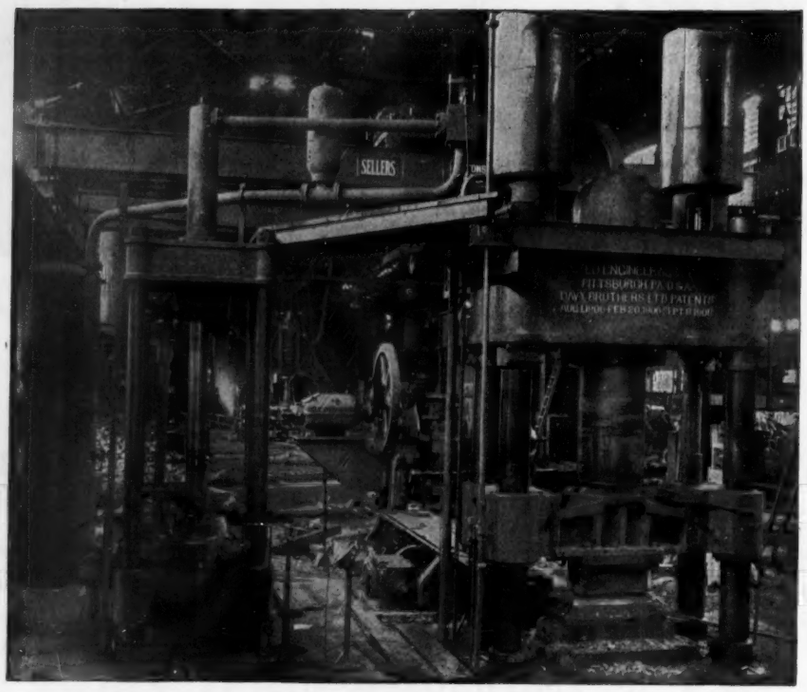

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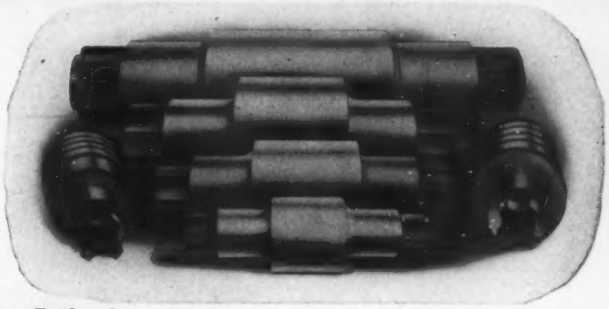

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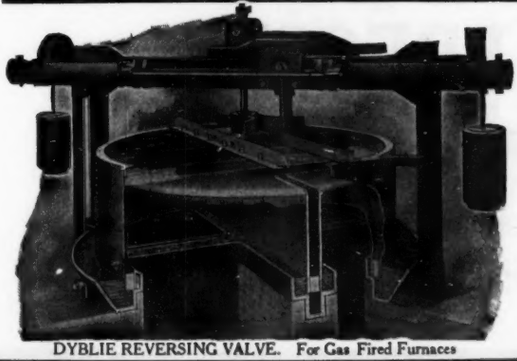

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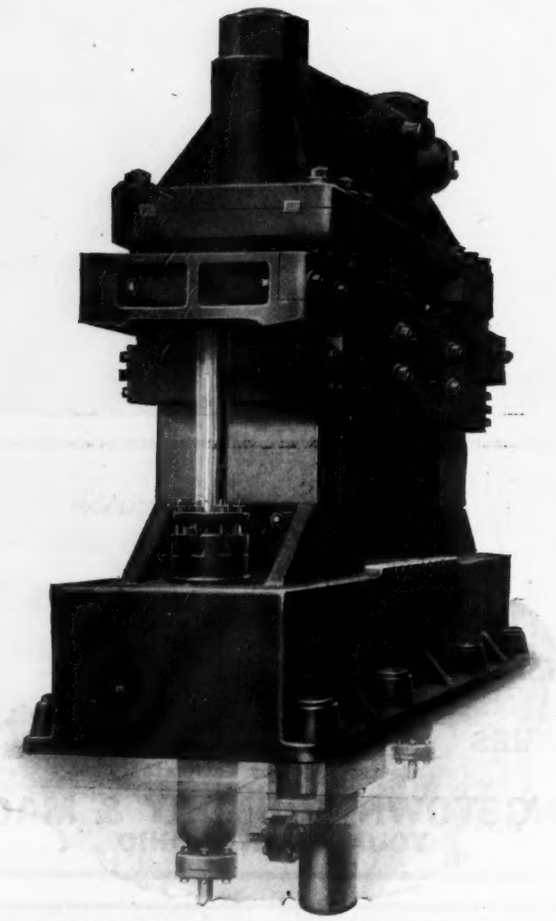

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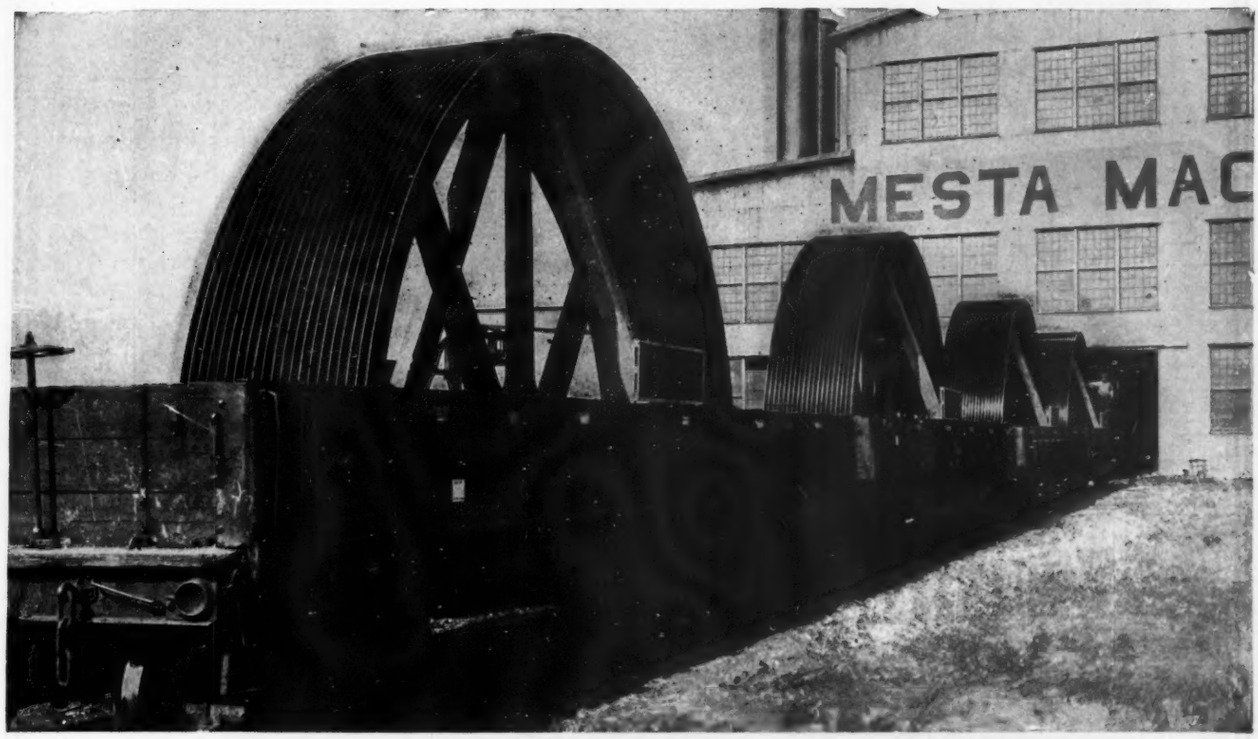

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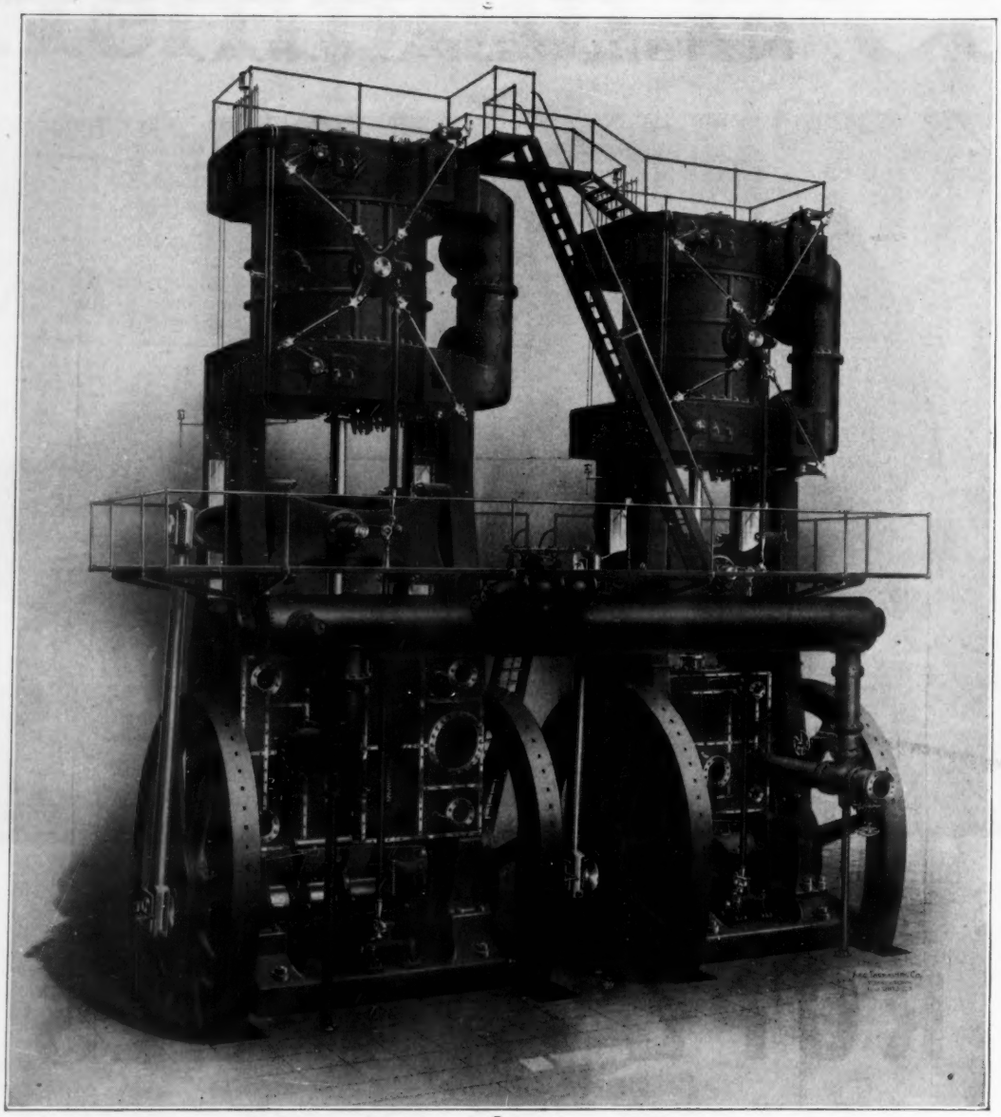

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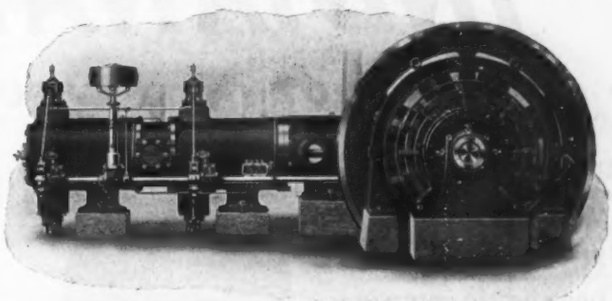

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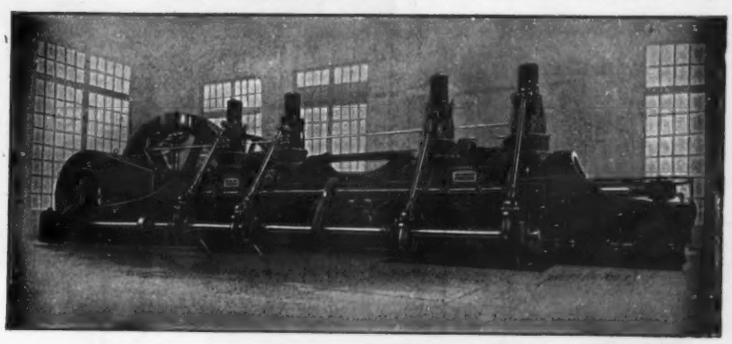

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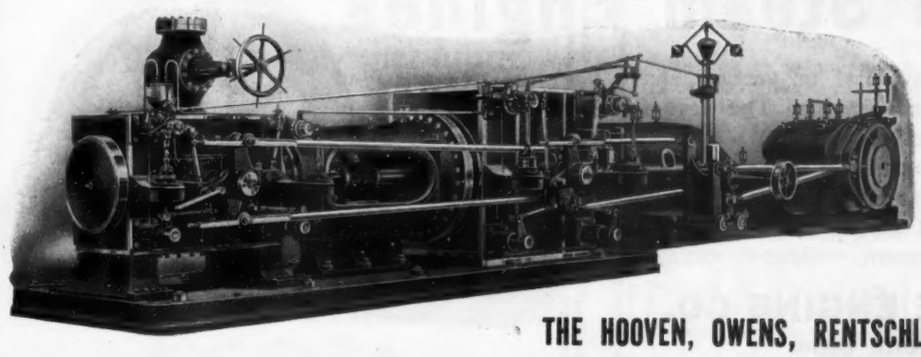

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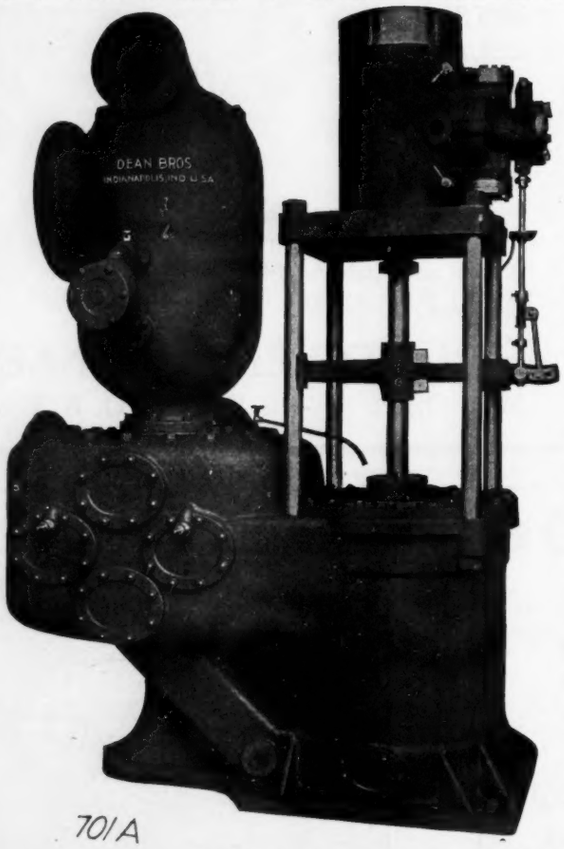

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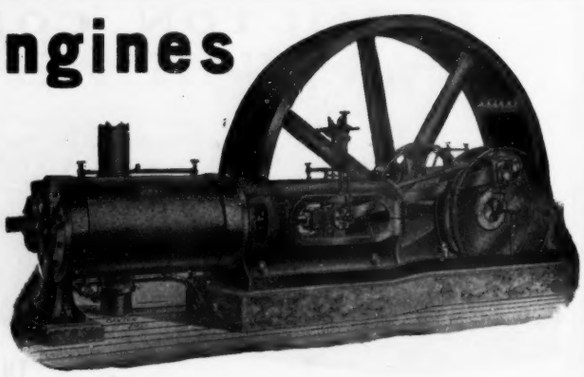

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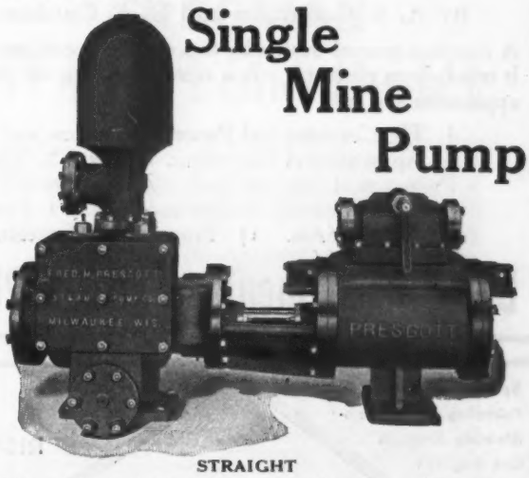

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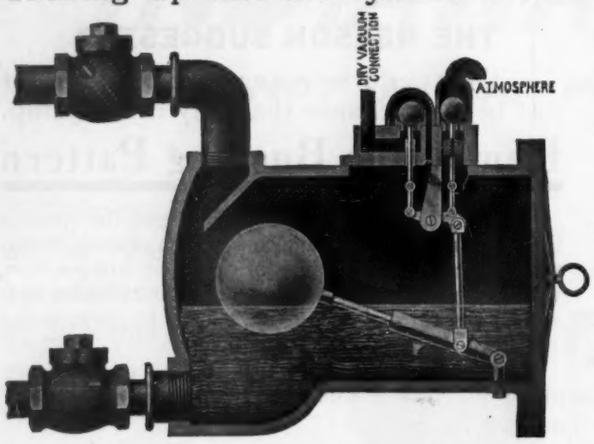

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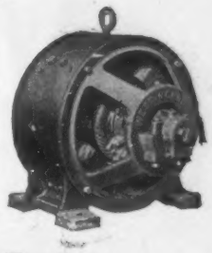

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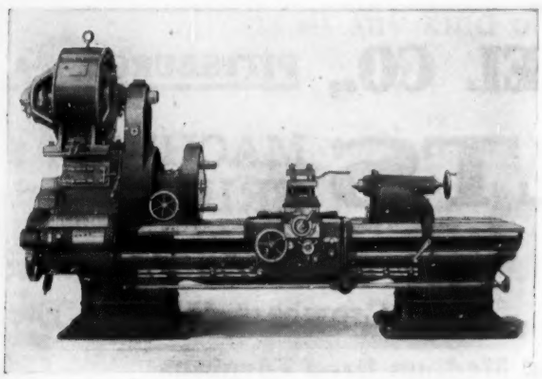

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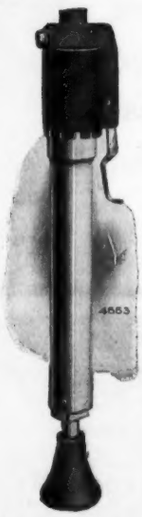

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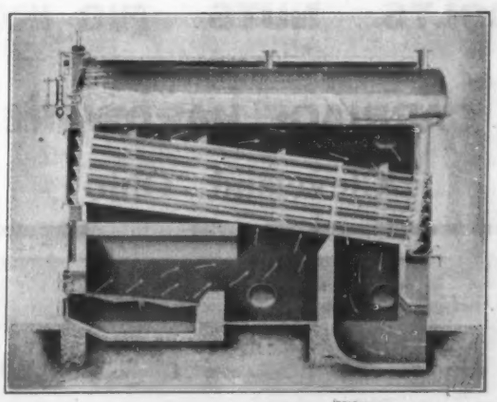

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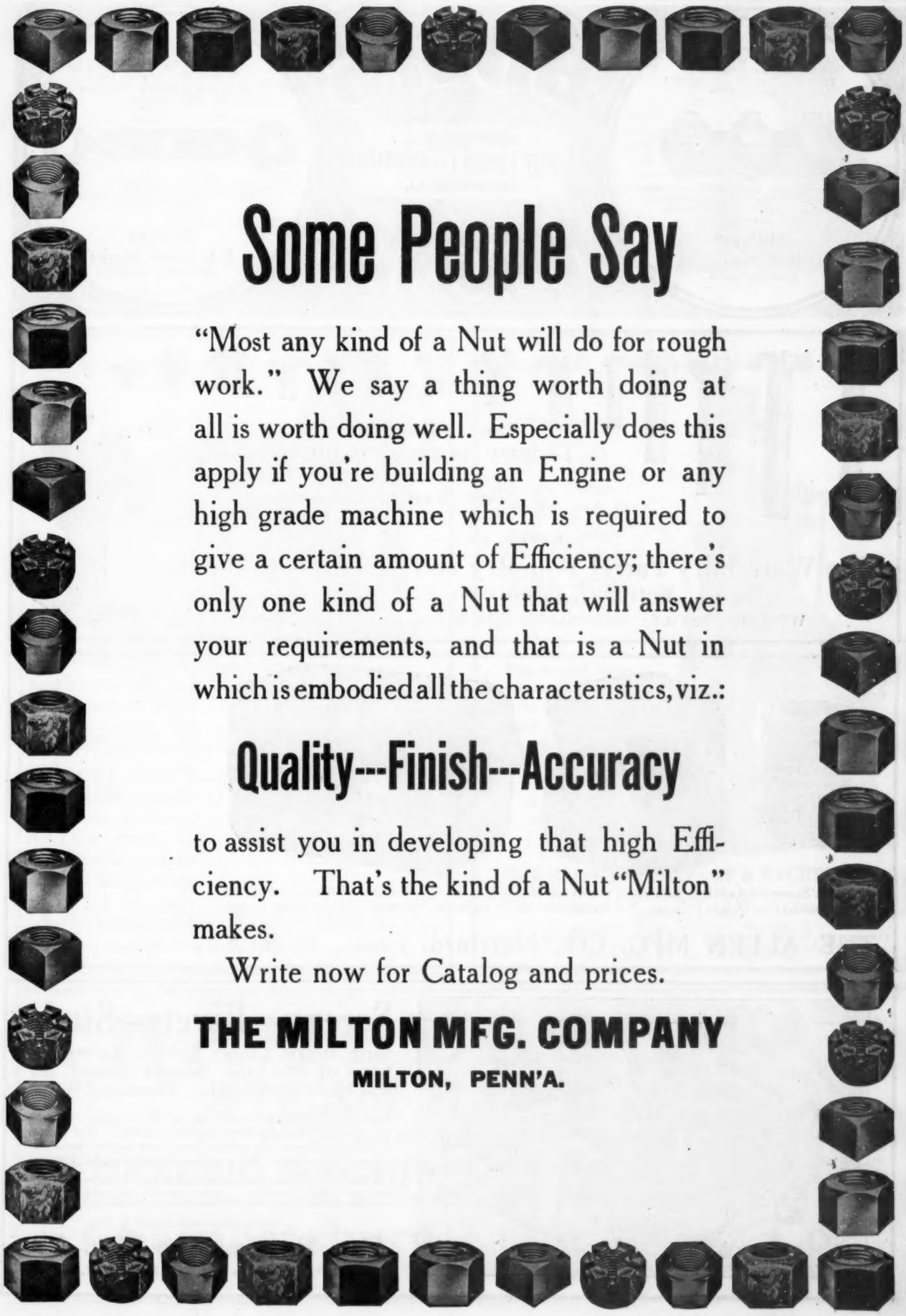

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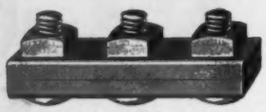

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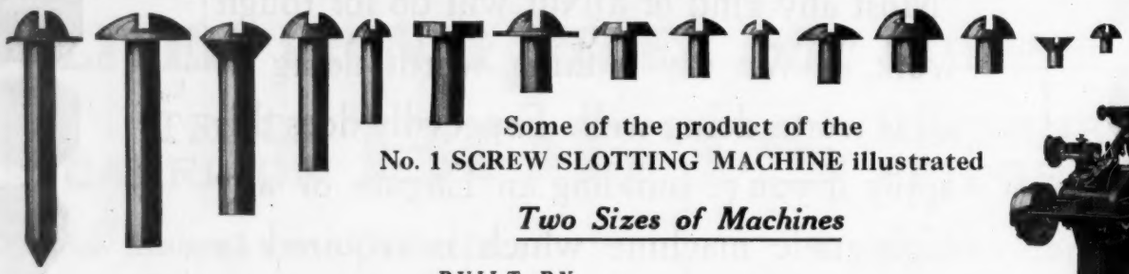

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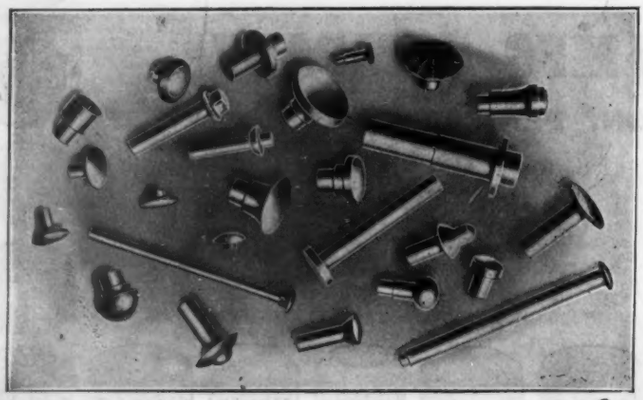

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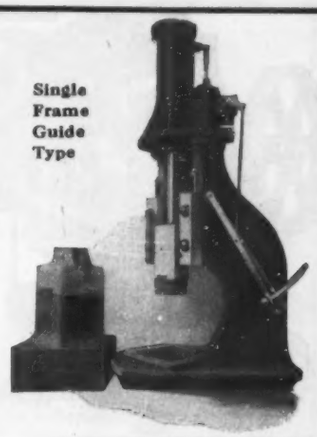

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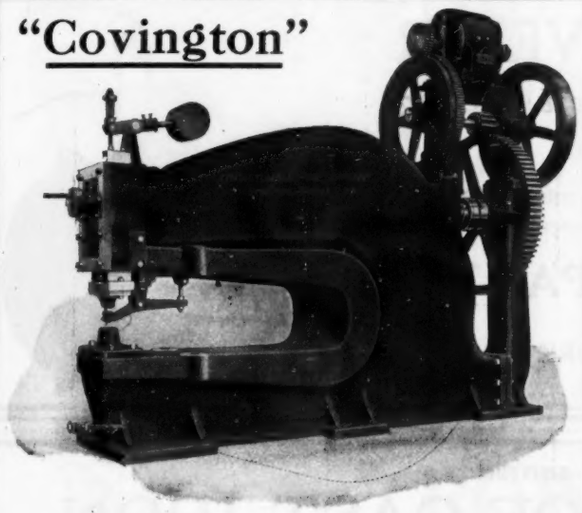

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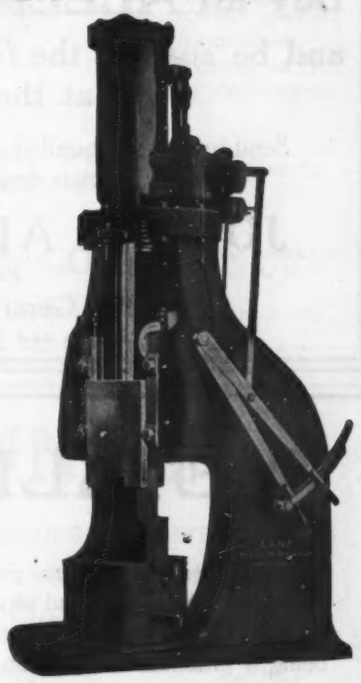

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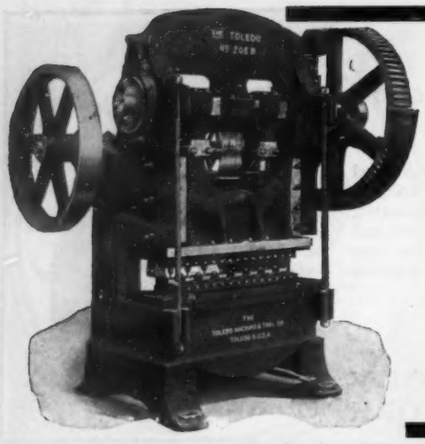

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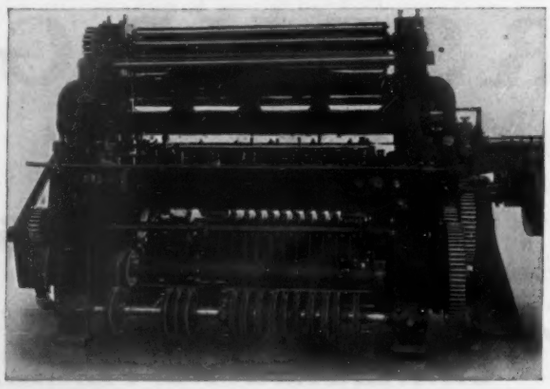

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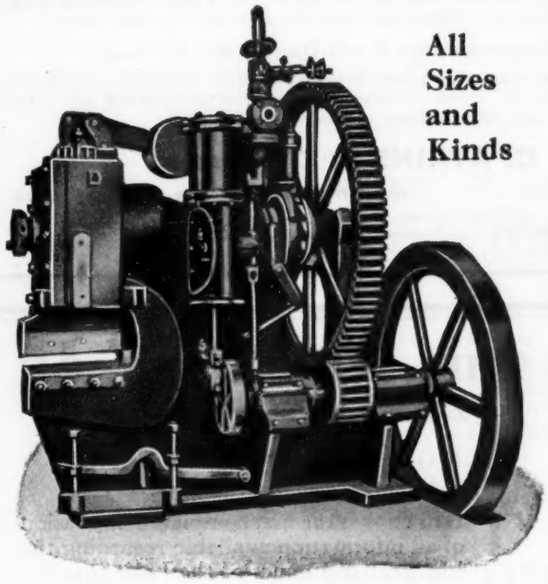

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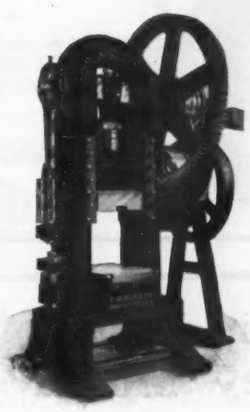

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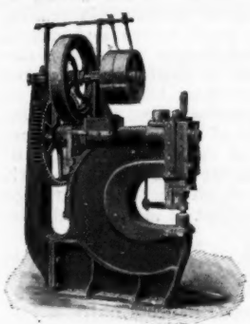

POWER PUNCH

We build a complete line of Punches, Shears and Bending Rolls, all sizes up to 75 tons in weight, for Boiler, Bridge, Structural and Sheet Iron Shops.

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MACHINERY

Punches and Shears
Bending Rolls
Straightening Rolls
Rotary Planers
Straightening Machines
Multiple Punches
Gate Shears
Radial Drills
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SMALL TOOLS

Punches and Dies
Chisel Blanks
Alloy or Carbon Steel Rivet Snaps
Pistons for Pneumatic Hammers
Flat Twisted Drills
Shear Blades
Air Hardening Steel Rivet Dies for Compression Riveters.
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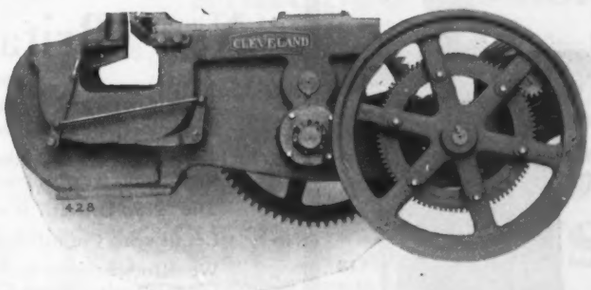
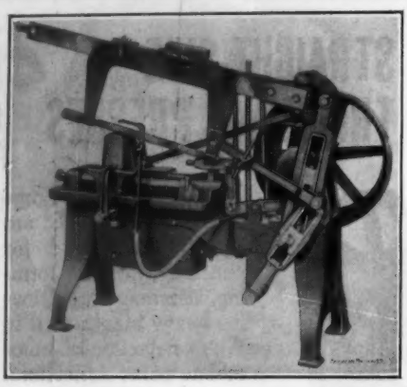


Write for Hand Book and Stock List No. 4, which will give a complete description of how to cut down your cost by standardizing your punching machinery.

The Cleveland Punch & Shear Works Co., CLEVELAND, OHIO



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Power Hack Saw Machine

Here is the most scientifically constructed Power Hack Saw Machine that has ever been made. It is impossible to operate the machine unless the ENTIRE BLADE is used. The closing of the vise automatically adjusts the length of the stroke irrespective of the size of material in vise.

A Positive Guarantee that it will Quickly Pay for Itself

Draw cut. Blade raised from work when not cutting. Absolute accuracy. Two speeds. Automatic stopping adjustment. Finest lubricating system. Quick return of saw arm. Send for new descriptive folder free. Write to nearest address below.

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Canadian Factory, Hamilton, Ont. **Home Office and Factory, Indianapolis, Ind.**

BRANCHES: Atlanta, Chicago, Memphis, Minneapolis, New Orleans, New York City, Portland, San Francisco, Seattle.

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"Key Model" WRENCH

is the finest engine room tool ever made, anywhere, by anybody, at any time.

Made of heavy steel forging, fully hardened by a special process, used by Mr. Coes for many years.

It will not batter or jam a large nut as will a chain wrench. It will not slip or make trouble and will take anything within its opening capacity, either square or hexagon.

Every Coes Wrench package bears this trade mark.

91

See that you get the genuine.

YOUR DEALER HAS THE "COES"

COES WRENCH CO.

WORCESTER, MASS.

THE IRON ORES OF LAKE SUPERIOR

BY

CROWELL AND MURRAY

Metallurgical Chemists and Mining Engineers

THIS book is the first complete compilation of all information available regarding the iron ores and mines of the Lake Superior region. Its purpose is to furnish an accurate and reliable reference book on the subject.

It gives briefly and concisely—The requirements of the furnaceman; methods of getting ore out of the ground; invaluable data for the prospector; descriptions of the various geological formations in which ore is found; names and facts about the different ores from which iron is made; a brief history of the finding of ore in the Lake Superior region; shows the increasing production since the early days; tables and charts showing the selling price and freight rates from the first shipments to 1911; data of most of the mines on the ranges, showing their exact location, date of opening, method of working and greatest depth; sales agents and yearly shipments of each mine from time opened to 1911; analysis of each mine for 1910; **Up-to-date maps of the several ranges with location and name of each mine on each range are included.** This one feature is alone worth the price of the book.

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Handsomely bound in cloth. Size 6 x 9 inches.

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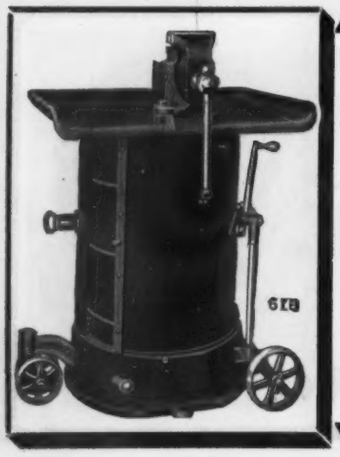

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can be used Stationary or Portable.

A COMBINED WORK BENCH AND TOOL CABINET for Assemblers, Inspectors, Contractors, ***Round Houses*** and ***Garages.***

The most useful bench in close quarters, having great strength without superfluous weight, and having ample room and extreme convenience.

The "New Britain" is more stiff than any arrangement of a vise on a tool rack.

Let us send you full information in regard to this "Vise-Stand"—it is a winner.

We also specialize in Vise-Stands—Lathe Racks and Pans—Shelving—Bench Legs—Stools—Waste Cans and many other indestructible conveniences.

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There is a Norton Grinding Wheel for Each Kind of Work

On certain operations, usually when the material is STEEL of any character, there is no wheel that compares favorably in point of efficiency with

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GRINDING WHEELS

on the other hand prove to be most efficient on such materials as cast iron, brass, bronze, pearl, marble and granite. It depends on what you grind.

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The Best File is one that cuts, easily, quickly, leaving a smooth surface---THAT'S THE

DISSTON

We manufacture our own steel, thereby are enabled to secure an ABSOLUTE

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In our own works we use annually 30,000 dozen DISSTON FILES.

We know what a good file should do and make the DISSTON FILES so they will do it.

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is fully warranted, made of high grade crucible steel, carefully forged throughout, teeth well formed, hardened by the Disston process---as perfect as a file can be made.

THE MOST DURABLE FILE ON THE MARKET

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Keystone Saw, Tool, Steel and File Works

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APPARATUS
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The Davis-Bournonville process of Oxy-Acetylene welding and cutting provides Efficiency and Economy of operation, secured by independent pressure of gases, positive mixture, fixed proportion and the neutral flame. These are the essential features for good results which have installed Davis-Bournonville apparatus in many of the largest industries of the country for repair work and manufacturing.

We provide complete welding and cutting equipment, generating and compressing plants, stationary and portable apparatus, outfits for repair shops, railroad shops and manufacturing plants, and desire investigation of merit and efficiency.

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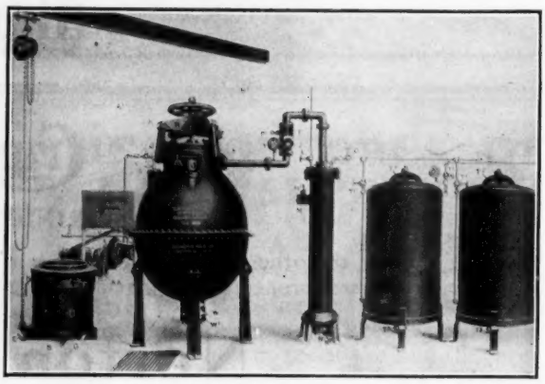
by the LAVOISITE system

Embodying Safety with Simplicity and a Guaranteed Yield for Oxy-Acetylene Welding, at Lowest Cost for Chemical Oxygen, for operators at a distance from compressed oxygen supply or desiring their own generating plants.

We are the Exclusive Agents for the United States and Canada. ***Full Information on Request***



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Recording Revolution Indicator

for recording the speed of Bessemer and Blast Furnace Blowing Engines. Used at Blast Furnace Plants in the United States, Canada, England and Germany.

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Branch Offices: PITTSBURG and CHICAGO

Manufacturers of the BROWN PYROMETER

ELECTRIC WELDING MACHINES

We manufacture the machines
FOR
SPOT WELDING or BUTT WELDING

Our Catalog tells all about them and tells how to

RIVET ELECTRICALLY WITHOUT RIVETS

NO LEASE, LICENSE OR ROYALTY

The "Toledo" Electric Welder Co.
2729 Knowlton St., Cincinnati, Ohio

Faster, Faster, Faster—

16 TIMES AS FAST

Greater Capacity,
Greater Profits—
Less Time—Less Expense

ALL BY VIRTUE OF THE

National Electric Welder

The "National" is the King of Spot Welders. Designed by Mechanical and Electrical Engineers, thorough experts, this machine accomplishes feats hitherto deemed impossible. Moreover, the skill of these expert men is always at your command.

Write us telling what you want to do, or send samples and we will weld them and return to you, telling the cost of the machine, the amount of work it will do, and what it costs to do it.

There are no strings on this proposition. When you buy a National Welder it's yours, and no Law Suits afterwards.

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It puts competition out of the race. Write us about it at once.

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FILES RASPS

Our firm policy of using the finest steel, tempered and cut according to the best methods known in modern practice, was the paramount factor in building the

Largest File Business In The World.

Our great factories have an output of 120,000 FILES and RASPS daily. 3,000 styles and sizes sold and used the world over.

NICHOLSON U.S.A

Nicholson File Co., Providence, R. I.

"God Bless Us Every One"

Lisped Tiny Tim—and what better greeting for you and for us at this happy Christmas time?

How the time gets away! Only yesterday it was last Christmas. We are getting old! Since we wrote our first Christmas advertisement sixteen years ago, we have come through "three panics" and have become grizzled and bald. How is it with you, old man?

Yes, the time flies. That youngster skylarking around here the other day as the "last cub" is now a serious journeyman with wife and babies. That good jour. has become the foreman. The foreman stands in the superintendent's shoes, and the hustling superintendent has become the "Old Man." The downy lipped junior has moved his traps to the desk in the inner office, and the Grand Old Seniors, gentle voiced and gentle mannered—who founded the business and built it up for you—lay down their splendid work and go to their long home. Let us remember and appreciate them just a little bit at Christmas.

With men, so with machines. The passing years establish the appliance of merit. The good thing of this year becomes the Old Reliable of next year. No, sir, not a word about Elevators. Why, boy, it's Christmas!

But say, Brother, you and I, who have talked here together every Thursday for a whole year—yea, for many whole years—are we not greatly blessed that this joyous Christmas time finds us here happy and prosperous? If our Elevators have made you happy, your many orders have made us prosperous. We have spoken our Little Piece week after week, poor enough sometimes but always the best we could, and you have so patiently listened to us, believed we told the truth, and sent us your orders, and said nice things about us, and—

Oh, well, we were just thinking how nice it is we have been able to be thus mutually helpful and useful to each other. This is the true secret of a Successful Life, after all, isn't it? This is what the CHRISTMAS MAN came to do.

And we wonder if it is not a good idea to stop once a year and lovingly think of these things.

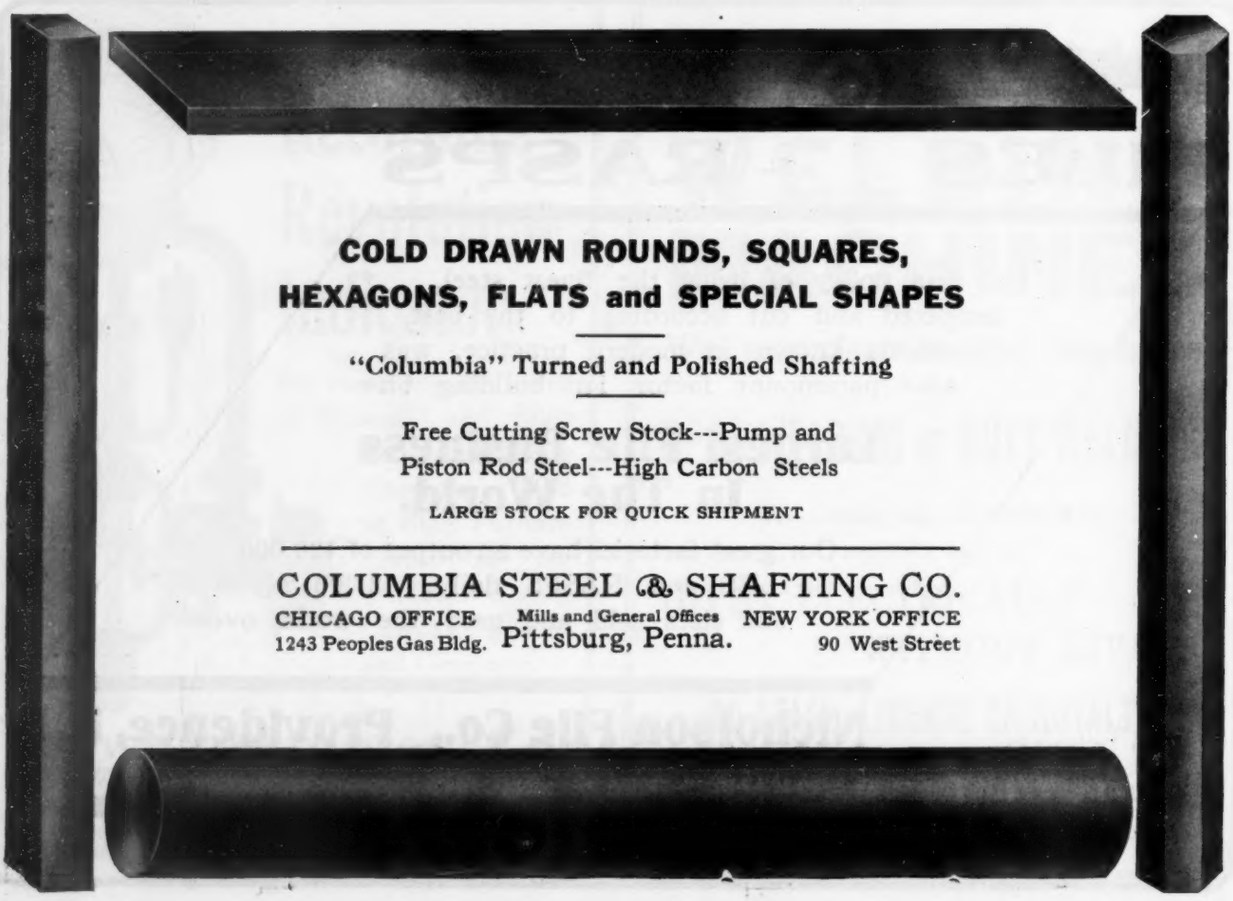
PLEASE TAKE THE ELEVATOR

May your heart and your life go like the Elevator—UP.

CRAIG RIDGWAY & SON, Coatesville, Pa.

DIRECT ACTING STEAM HYDRAULIC ELEVATOR

DOUBLE GEARED STEAM HYDRAULIC ELEVATOR



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"Columbia" Turned and Polished Shafting

Free Cutting Screw Stock---Pump and Piston Rod Steel---High Carbon Steels

LARGE STOCK FOR QUICK SHIPMENT

COLUMBIA STEEL & SHAFTING CO.

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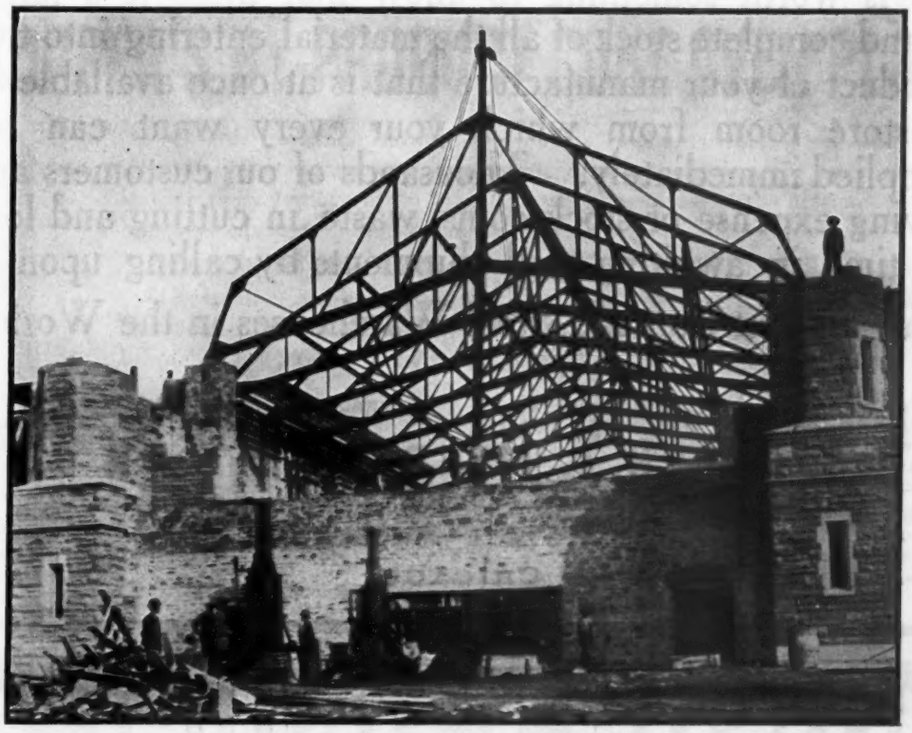
American Bridge Company of New York

Structural Steel for Every Purpose

Offices in 17 American Cities



Auditorium Bldg. for University of Colorado at Boulder, Colo.

General Offices: Hudson Terminal, 30 Church Street, New York

Export Representatives:—United States Steel Products Company, 30 Church Street, New York

Pacific Coast Representative—United States Steel Products Co., (Pacific Coast Dept.) Rialto Bldg., San Francisco, Cal.

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Established 1852

La Belle Sheets are fine and soft of texture; they bend, seam, groove and take all required forms without breaking or cracking.

"From mine to market" they are produced by one house working steadily toward one goal---La Belle leadership, based on the betterness of La Belle products.

See full page advertisement on page 7.

La Belle Iron Works

General Offices, Steubenville, O.

Works, Steubenville, O. Works, Wheeling, W. Va.

There's so much boiled down in the word "La Belle."

Steel and Iron

IT is worth something to know that there is a large and complete stock of all the material entering into the product of your manufacture that is at once available---a store room from which your every want can be supplied immediately. Thousands of our customers are saving expense of stockrooms, waste in cutting and loss of time in awaiting mill shipments by calling upon---

The Largest Iron and Steel Warehouses in the World.

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ESTABLISHED 1842 INCORPORATED 1888

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IRON STEEL MACHINERY

CHICAGO

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WHITE PINE PATTERN TEMPLET LUMBER

Crating, Boxing and Flask Stock

Let us hear from you today

MILWAUKEE WISCONSIN

The Year 1911 is nearly ended and YOU did not get to do all that you planned.

YOU ARE GOING TO DO A WHOLE LOT OF THINGS NEXT YEAR.

Let one of your New Year Resolutions be to build a

KOPPER'S BY-PRODUCT COKE OVEN PLANT

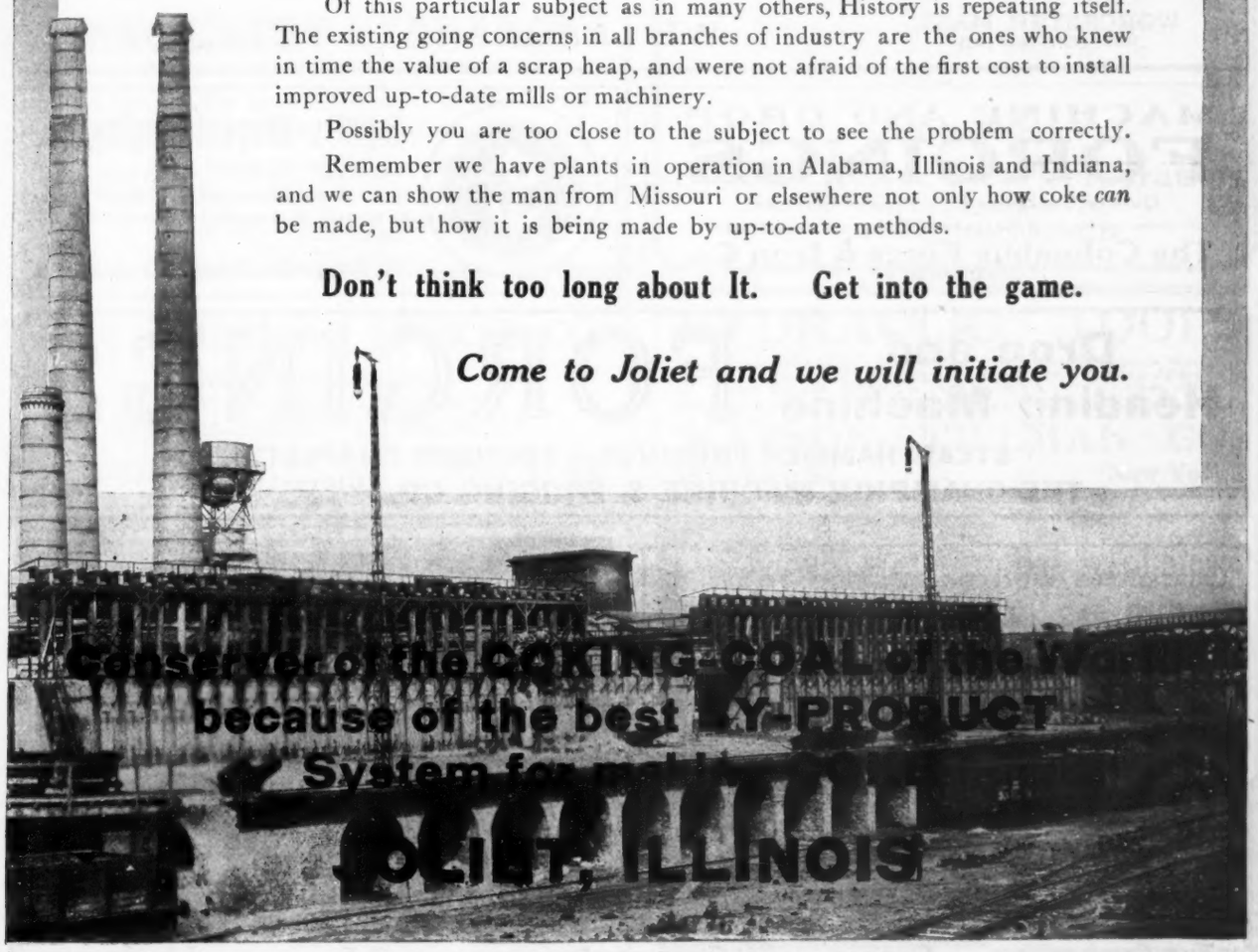
Of this particular subject as in many others, History is repeating itself. The existing going concerns in all branches of industry are the ones who knew in time the value of a scrap heap, and were not afraid of the first cost to install improved up-to-date mills or machinery.

Possibly you are too close to the subject to see the problem correctly.

Remember we have plants in operation in Alabama, Illinois and Indiana, and we can show the man from Missouri or elsewhere not only how coke *can* be made, but how it is being made by up-to-date methods.

Don't think too long about It. Get into the game.

Come to Joliet and we will initiate you.



E want your forging business. We haven't the space to tell you why it will pay you to give it to us, but our representative will give you the reasons.

Just write to us the next time you want to buy forged material.

Steel Car Forge Company

"FORGING SPECIALISTS"

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GENERAL DROP FORGE CO.

SPECIAL DROP FORGINGS OF ALL KINDS TO ORDER

SEND US PRINTS OR MODELS FOR PRICES

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Write us for quotations

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FORGINGS OF ALL DESCRIPTIONS

THE WYMAN & GORDON COMPANY

WORCESTER, MASS. ESTABLISHED 1883 — WE LEAD — CLEVELAND, OHIO ESTABLISHED 1903

MACHINE AND DROP

FORGINGS

Quality Guaranteed. Prompt Shipment

No order too large—None too small for our careful attention.

The Columbus Forge & Iron Co.
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Ingalls-Shepard Forging Co.

Heavy and Light FORGINGS of every description. *Drop Hammer Work.* We make a specialty of Automobile, Railway and Machinery Work.

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THE CHAMPION MACHINE & FORGING CO., Cleveland, O. "Sixth City"

Guaranteed Work and Prompt Service in

High Grade Drop Forgings

of every description in Iron, Steel, Copper, Bronze

THE TRANSUE & WILLIAMS CO.
ALLIANCE, O.

DROP FORGINGS OF ALL KINDS

OUR PLANT IS COMPLETE WITH ALL THE LATEST IMPROVED EQUIPMENT

WE SOLICIT YOUR INQUIRIES AND GUARANTEE FIRST CLASS WORK—PROMPTLY DELIVERED

The Superior Drop Forge & Manufacturing Co.
CLEVELAND, OHIO

WE ARE MAKING THE MOST DIFFICULT PARTS FOR SOME OF THE LARGEST CONCERNS IN THE COUNTRY

IF IT CAN BE DONE WE CAN DO IT
LET US QUOTE YOU PRICE

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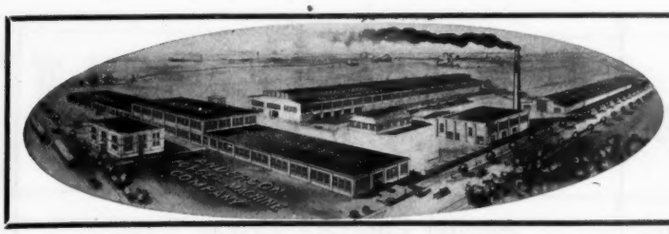
WE HAVE DOUBLE POWER PLANTS—NO DELAYS THROUGH LOSS OF POWER. A THOROUGHLY UP-TO-DATE EQUIPMENT



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DETROIT, MICH.
DROP FORGINGS
OF EVERY DESCRIPTION

CRANK SHAFTS CONNECTING RODS
MACHINE FORGINGS
STEEL FORGINGS
ELLWOOD CITY FORGE CO.
ELLWOOD CITY, PA.

Axles for Passenger or Freight Cars and Locomotives
"Pollak" Special Heat Treated Steel, Open Hearth, Nickel or Vanadium Steel.

MARINE MACHINE and ENGINE from 10 lbs. to 100,000 lbs. each of every shape and description. **Forgings**
THE POLLAK STEEL CO., Cincinnati, Ohio

The Standard Pattern Works Co.
CLEVELAND, OHIO
WOOD AND METAL PATTERNS
OF EVERY DESCRIPTION
Nothing Too Big or Too Small for Us
C. BIRNBAUM, Pres. and Treas. E. J. GUTMAN, V. Pres. and Gen. Mgr.

CRANK SHAFTS
Forged Steel Boiler Flanges
GENERAL FORGINGS
J. A. SUNDBERG CO.
Kinzie and Carpenter Streets
CHICAGO

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THE IRON TRADE REVIEW
devotes a section to the buying and selling of used machinery and is known and referred to as the
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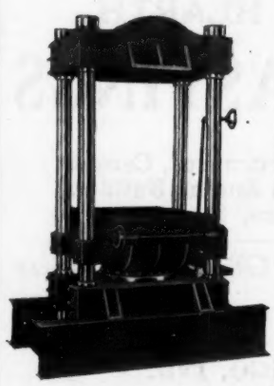
WHERE THE BUYER AND SELLER MEET
It is by far the most referred to section in the Iron, Steel and Machinery industry.
Address all communications to
MACHINERY EXCHANGE DEPARTMENT
The Iron Trade Review
CLEVELAND, O.

What Steel Do You Use For YOUR TOOLS?
"SISCO ACORN" STEEL?
For holding a keen cutting edge this steel is being recognized as a standard. Our iron-clad guarantee—without a string to it—protects you from risks.
Find out what it means.
WRITE NOW
Swedish Iron & Steel Corporation
12 Platt Street, New York
428 Race Street, New Orleans, La.

THE AMERICAN STOKER CO.
NEW OVERFEED STOKERS.
NEW UNDERFEED STOKERS.
STOKERS--FOR HEATING FURNACES.
11 BROADWAY NEW YORK

HYDRAULIC TOOLS
Pumps, Accumulators, Intensifiers, Presses, Punches, Shears, Coping Machines, Shaft Straighteners, Bolt Forcers, Benders, Jacks, Valves, Fittings, Twinvolute Turbine Pumps, Tank Switches, etc.
Write for Catalogs. We build to order to meet special requirements.
WATSON-STILLMAN CO.
55 Church St. New York.



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for all High Pressure Purposes, Forming Presses, Forcing and Wheel Presses, Emery and Corundum Wheel Presses, Metal Scrap Baling Press, Power Presses.
Hydraulic belt driven and Steam Pumps and Accumulators.
Specifications and Prices for your requirements promptly furnished upon application.
THE HYDRAULIC PRESS MFG. CO.
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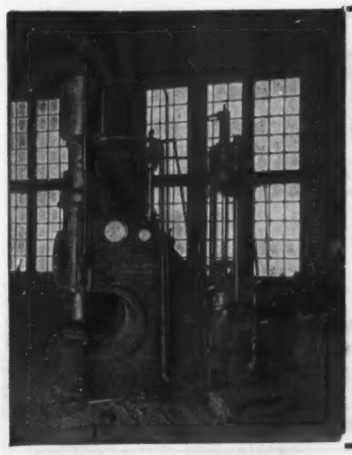
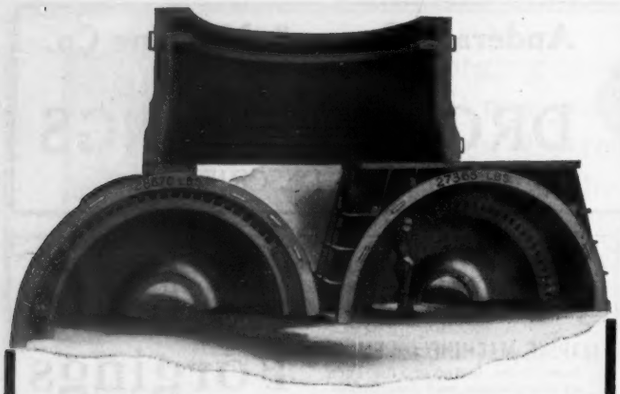


High Speed Steam Hydraulic Forging Press
See advertisement on Page 28 this issue of "The Iron Trade Review."
United Engineering & Foundry Co.
PITTSBURG, PENNA.



LOAM CASTINGS

Made by

The Birdsboro Steel Foundry & Machine Co.

Manufacturers also of hydraulic and Rolling Mill Machinery, The Jackson Belt Lacer, The Wagner Cold Saw, Ingot Cars. Blast Furnace Castings a Specialty. Special Machinery of all kinds.

STEEL CASTINGS

Open Hearth, Cupola and Air Furnace Castings.

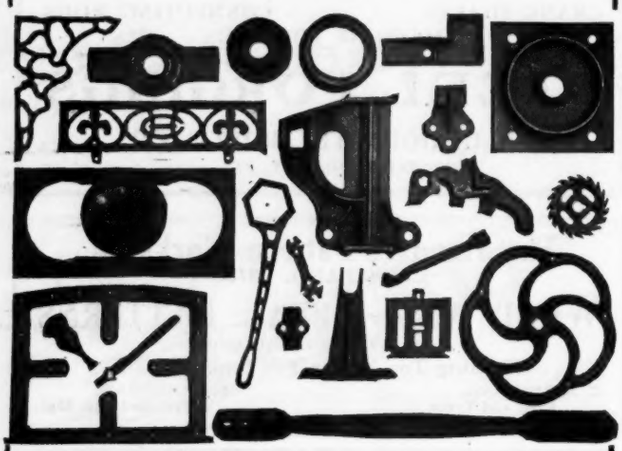
BIRDSBORO STEEL FOUNDRY & MACHINE CO.

BIRDSBORO, PENNSYLVANIA

MALLEABLE IRON CASTINGS

OF EVERY DESCRIPTION

Annual Capacity 25,000 Tons



Railroad and Stove Plate Malleables a Specialty

Prices furnished on receipt of Samples or Blue Prints.

MISSOURI MALLEABLE IRON CO.
EAST ST. LOUIS, ILL.

The Interstate Foundry Co.

Cleveland, O.

Automobile Parts
Pipe Bells
General Grey Iron Castings

Fine Castings.

Ingot Molds
Machinery Castings
Chemical Plant Castings

Malleable Iron Pipe Fittings

MADE OF AIR FURNACE IRON

PERFECT PROPORTIONS

ASK THIS M **FOR BRAND**

THE FITTING WITH THE LONG, TAPERED, MACHINE REAMED THREAD

Write for Catalogue

ILLINOIS MALLEABLE IRON CO.
CHICAGO, ILL.

ACID OPEN HEARTH

STEEL CASTINGS

FOR
Rolling Mills, Blast Furnaces, Cement Mills, Machinery and Engine Builders, Gear Cutters, Etc.

MACHINE MOLDED GEARS—Any Size

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

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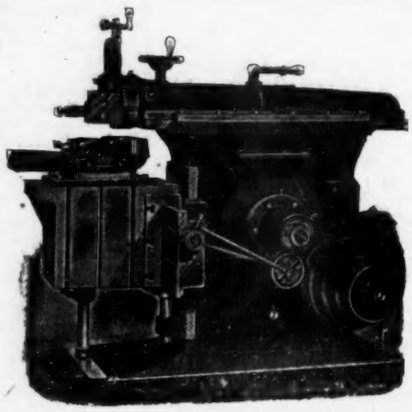

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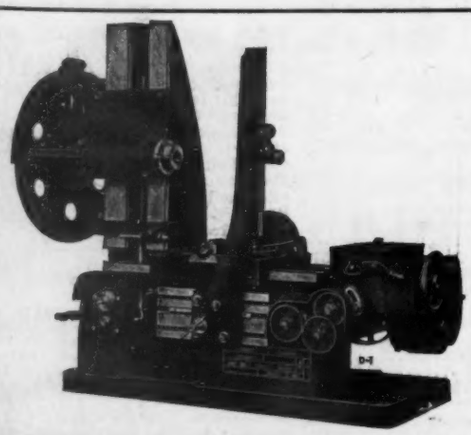

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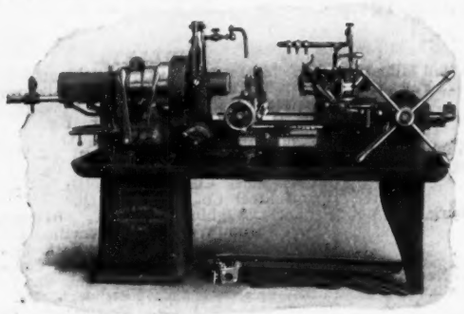

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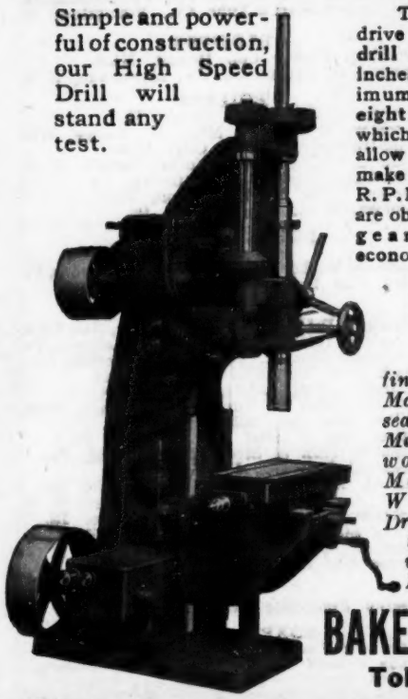

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Ashland Fire Brick Co., Ashland, Ky.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Pyro Clay Products Co., Oak Hill, O.
Stevens, F. B., Detroit, Mich.
Stowe-Fuller Co., Cleveland, O.

BLOOMS.
Carnegie Steel Co., Pittsburg, Pa.
Hillman, J. H., & Son, Pittsburg, Pa.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
LaBelle Iron Works, Steubenville, O.
Lackawanna Steel Co., New York City.
National Tube Co., Pittsburg, Pa.
Tennessee Coal, Iron & R. R. Co., B'm'g'm, Ala.
United Steel Co., Canton, O.
Wood, Alan, Iron & Steel Co., Philadelphia, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

BLOWERS.
American Blower Co., Detroit, Mich.
Green Fuel Economizer Co., Matteawan, N. Y.

BOILERS.
Cooper, C. & G., Mt. Vernon, O.
Freeman, S., & Sons Mfg. Co., Racine, Wis.
Industrial Works, Bay City, Mich.
Lake Erie Engineering Works, Buffalo, N. Y.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Sharon Boiler Works, Sharon, Pa.
Toomey, Frank, Philadelphia, Pa.

BOILER SETTINGS.
(Fire Brick.)
Harbison-Walker Refractories Co., Pittsburg, Pa.
Pyro Clay Products Co., Oak Hill, O.

BOLTS.
American Bridge Co. of New York, New York.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Clark Bros. Bolt Co., Milldale, Conn.
Columbus Bolt Works, Columbus, O.
Michigan Bolt & Nut Works, Detroit, Mich.
Milton Mfg. Co., Milton, Pa.
Oliver Iron & Steel Co., Pittsburg, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.
Rockford Bolt Co., Rockford, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Steel Car Forge Co., Pittsburg, Pa.
Upson Nut Co., Cleveland, O.

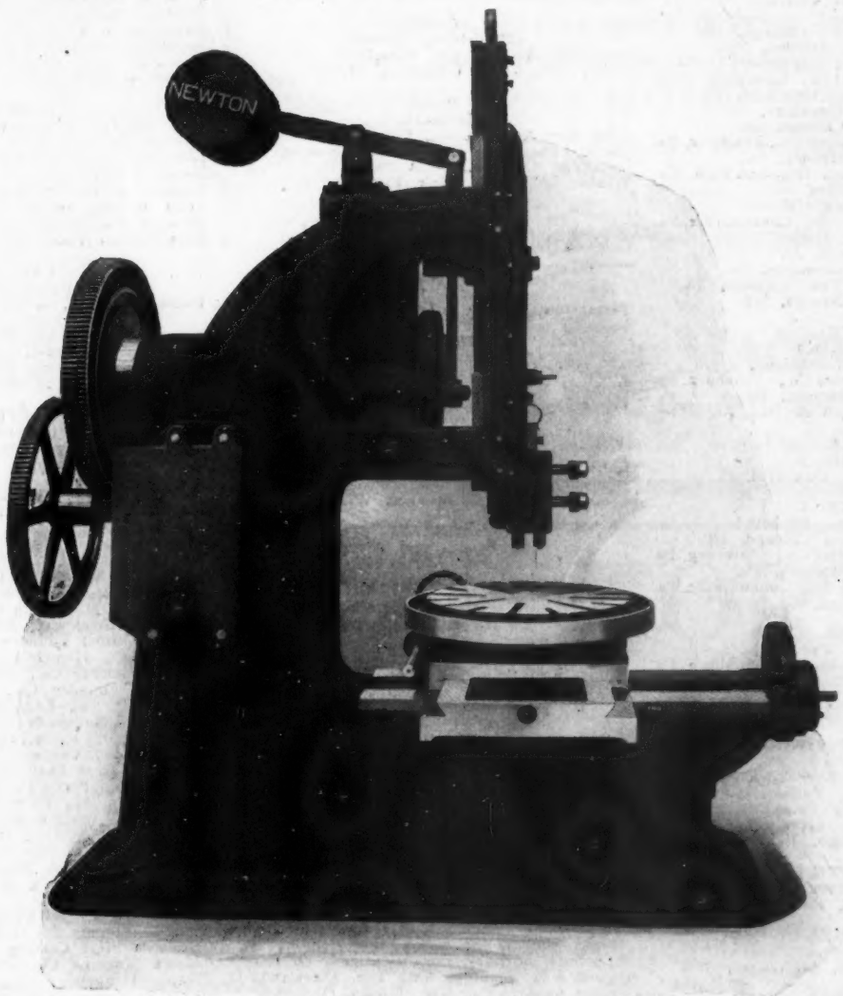
BOOKS.
Penton Publishing Co., Cleveland, O.

BOXES. (Annealing.)
Kennicott Co., Chicago, Ill.
Knox Pressed & Welded Steel Co., Pittsburg.
United Engineering & Fdy. Co., Pittsburg.
Wilfong Iron Works Co., M. F., Philadelphia.

NEWTON

(REGISTERED TRADE MARK)

Rail Ending Machines, Rail Drilling Machines, Heavy Spur Gear Cutting Machines, Horizontal Boring, Drilling and Milling Machines, Cold Metal Sawing Machines, Rotary Planing Machines.



12″ Crank Slotting Machine

Newton Slotting Machines are designed on an economic basis; extreme care is taken in selecting and distributing material and locating levers of control, to prolong the usefulness, eliminate vibration and insure flexibility of control on all sizes.
Crank driven type 6″ to 24″.

Newton Machine Tool Works, Inc.

Philadelphia, U. S. A.

Foreign Representatives: Berlin, Heinrich Dreyer. Vienna, Rudolph Salzer. Italy, Spain, Switzerland, Belgium and France, Fenwick, Freres & Co., Paris, France. Montreal, Canada, Williams & Wilson. Yokohama, Japan, Manning, Maxwell & Moore.

WHERE TO BUY

BRAKES. (Disc.)
Cutler-Hammer Clutch Co., Milwaukee, Wis.
Cutler-Hammer Mfg. Co., Milwaukee, Wis.

BRAKES.
(Electric.)
Electric Controller & Mfg. Co., Cleveland, O.
Toledo Bridge & Crane Co., Toledo, O.

BRAKES.
(Power and Cornice.)
Dreis & Krump Mfg. Co., Chicago, Ill.

BRAZING.
(Custom.)
Champion Rivet Co., Cleveland, O.

BREAKER (Pig Iron).
Brown Hoisting Machinery Co., Cleveland, O.

BREAKERS. (Circuit.)
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

BRICK AND CLAY.
(Fire.)
American Refractories Co., Chicago, Ill.
Ashland Fire Brick Co., Ashland, Ky.
Bickford Fire Brick Co., Curwensville, Pa.
Blackwell, Sons & Co., Ltd., Liverpool, Eng.
Clearfield Fire Brick Co., Clearfield, Pa.
Dover Fire Brick Co., Cleveland, O.
Garden City Sand Co., Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Kier Fire Brick Co., Pittsburg, Pa.
Louisville Fire Brick Wks., Highland Park, Ky.
Niles Fire Brick Co., Niles, O.
Ohio Fire Brick Co., Oak Hill, O.
Soisson, Jos., Fire Brick Co., Connellsville, Pa.
Stevens, F. B., Detroit, Mich.
Stowe-Fuller Co., Cleveland, O.
Swank's Sons, Hiram, Johnstown, Pa.
Thomas Moulding Co., The, Chicago, Ill.
Union Mining Co., Mt. Savage, Md.

BRICK.
(Coke Oven.)
Ashland Fire Brick Co., Ashland, Ky.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Kier Fire Brick Co., Pittsburg, Pa.
Pyro Clay Products Co., Oak Hill, O.

BRICK.
(Fire Arch.)
Pyro Clay Products Co., Oak Hill, O.

BRICK.
(Silica, Magnesia, Chrome.)
American Refractories Co., Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Kier Fire Brick Co., Pittsburg, Pa.
Soisson, Jos., Fire Brick Co., Connellsville, Pa.
Stowe-Fuller Co., Cleveland, O.

BRICK.
(Stove Blast Furnace.)
Harbison-Walker Refractories Co., Pittsburg, Pa.
Kier Fire Brick Co., Pittsburg, Pa.
Thomas Moulding Co., The, Chicago, Ill.
Union Mining Co., Mt. Savage, Md.

BRIDGES AND VIADUCTS.
(Steel.)
American Bridge Co. of New York, New York.
Lackawanna Bridge Co., Buffalo, N. Y.
McClintic-Marshall Const. Co., Pittsburg, Pa.
McMyler Interstate Co., Cleveland, O.
Worden-Allen Co., Chicago, Ill.

BRONZE.
(Vanadium.)
American Vanadium Co., Pittsburg, Pa.

BRUSHES.
(Dynamo.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.

BUCKETS.
(Clam Shell, Grab or Orange Peel.)
Andresen Evans Co., Chicago, Ill.
Brown Hoisting Machy. Co., Cleveland, O.
McMyler Interstate Co., Cleveland, O.

BUCKETS.
(Coal and Ore.)
Andresen-Evans Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, O.

BUCKETS.
(Elevator and Hoisting.)
Bartlett, C. O., & Snow Co., Cleveland, O.
Illinois Malleable Iron Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
Wellman-Seaver-Morgan Co., Cleveland, O.

BUCKETS.
(Excavating.)
Andresen Evans Co., Chicago, Ill.

BULLDOZERS.
Chambersburg Engrg. Co., Chambersburg, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland.
Long & Allstatter Co., Hamilton, O.
United Engrg. & Fdy. Co., Pittsburg, Pa.

BURRS.
(Rivet.)
Wrought Washer Mfg. Co., Milwaukee, Wis.

CABLEWAYS.
Brown Hoisting Machinery Co., Cleveland, O.
McClintic-Marshall Const. Co., Pittsburg, Pa.

CARS.
(Annealing, Pig Iron, Etc.)
Chase Foundry & Mfg. Co., Columbus, O.
Whiting Foundry Equipment Co., Harvey, Ill.

CARS.
(Charging.)
Industrial Car Co., West Park, O.

CARS.
(Coal, Coke and Mining.)
Industrial Car Co., West Park, O.
Jeffrey Mfg. Co., Columbus, O.
Massillon Fdy. & Machine Co., Massillon, O.
National Malleable Castings Co., Cleveland, O.

CARS.
(Electrically Driven.)
Atlas Car & Mfg. Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.

CARS.
(Industrial.)
Atlas Car & Mfg. Co., Cleveland, O.
Chase Foundry & Mfg. Co., Columbus, O.
Industrial Car Co., West Park, O.
Wiener Co., Ernst, New York, N. Y.

CARS.
(Steel.)
Cambria Steel Co., Johnstown, Pa.

CASING.
(Oil and Gas.)
Youngstown Sheet & Tube Co., Youngstown, O.

CASTINGS.
(Agricultural Implements.)
Frazer & Jones, Syracuse, N. Y.
National Malleable Castings Co., Cleveland, O.
Prime Steel Co., Milwaukee, Wis.

CASTINGS.
(Auto.)
Chisholm & Moore Mfg. Co., Cleveland, O.
Interstate Foundry Co., Cleveland, O.
Prime Steel Co., Milwaukee, Wis.

CASTINGS.
(Brass, Bronze and Aluminum.)
Lorain Casting Co., Lorain, O.
Mesta Machine Co., Pittsburg, Pa.

CASTINGS.
(Crucible Steel.)
Adrian Steel Casting Co., Adrian, Mich.
Keystone Steel Casting Co., Chester, Pa.
Prime Steel Co., Milwaukee, Wis.
West Steel Casting Co., The, Cleveland, O.

CASTINGS.
(Die.)
Prime Steel Co., Milwaukee, Wis.

CASTINGS.
(Gray Iron.)
American Bridge Co. of New York, N. Y.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Bucyrus Steel Casting Co., The, Bucyrus, O.
Buffalo Fdy. & Machine Co., Buffalo, N. Y.
City Foundry Co., The, Cleveland, O.
Covington Machine Co., Covington, Va.
Farrel Fdy. & Machine Co., Ansonia, Conn.
Ferguson & Lange Foundry Co., Chicago, Ill.
Flagg, Stanley G., & Co., Philadelphia, Pa.
Interstate Foundry Co., Cleveland, O.
Johnston & Jennings Co., The, Cleveland, O.
Lorain Casting Co., The, Lorain, O.
Marshall Foundry Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
National Foundry Co., Erie, Pa.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.
Ross-Meehan Fdy. Co., Chattanooga, Tenn.
Superior Foundry Co., Cleveland, O.
Taylor & Boggis Foundry Co., Cleveland, O.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Union Foundry & Machine Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.
U. S. Cast Iron Pipe & Fdy. Co., New York.
Wheeling Mold & Fdy. Co., Pittsburg.
Youngstown Fdy. & Mch. Co., Youngstown, O.

CASTINGS.
(Gray Iron, Car and Locomotive.)
Buffalo Fdy. & Mach. Co., Buffalo, N. Y.
City Foundry Co., The, Cleveland, O.
Lake Erie Engineering Works, Buffalo, N. Y.
National Foundry Co., Erie, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.

CASTINGS.
(Gray Iron Machinery.)
City Foundry Co., The, Cleveland, O.
Ferguson & Lange Foundry Co., Chicago, Ill.
Interstate Foundry Co., Cleveland, O.
Lorain Casting Co., The, Lorain, O.
Superior Foundry Co., Cleveland, O.
Taylor & Boggis Foundry Co., Cleveland, O.

CASTINGS.
(Malleable.)
Acme Steel & Malleable Iron Wks., Buffalo, N. Y.
Barlow Foundry Co., Newark, N. J.
Belle City Malleable Iron Co., Racine, Wis.
Chisholm & Moore Mfg. Co., Cleveland, O.
Dayton Malleable Iron Co., Dayton, O.
Erie Malleable Iron Co., Erie, Pa.
Flagg, Stanley G., & Co., Philadelphia, Pa.
Frazer & Jones, Syracuse, N. Y.
Globe Malleable Iron & Steel Co., Syracuse, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Lakeside Malleable Castings Co., Racine, Wis.
Missouri Malleable Iron Co., E. St. Louis, Ill.
Moline Malleable Iron Co., St. Charles, Ill.
National Malleable Castings Co., Cleveland, O.
Ohio Malleable Iron Co., Columbus, O.
Pratt & Letchworth Co., Buffalo, N. Y.
Prescott Malleable Iron Co., Milwaukee, Wis.
Ross-Meehan Foundry Co., Chattanooga, Tenn.
Standard Malleable Iron Co., Muskegon, Mich.
Union Malleable Iron Co., East Moline, Ill.
Wisconsin Malleable Iron Co., Milwaukee, Wis.

CASTINGS.
(Malleable, Car and Locomotive.)
Dayton Malleable Iron Co., Dayton, O.
Lakeside Malleable Castings Co., Racine, Wis.
Missouri Malleable Iron Co., E. St. Louis, Ill.
National Malleable Castings Co., Cleveland, O.
Pratt & Letchworth Co., Buffalo, N. Y.
Prescott Malleable Iron Co., Milwaukee, Wis.
Ross-Meehan Foundry Co., Chattanooga, Tenn.

CASTINGS.
(Manganese.)
Prime Steel Co., Milwaukee, Wis.

CASTINGS.
(Open-Hearth Steel.)
Columbia Steel Co., Portland, Ore.
Prime Steel Co., Milwaukee, Wis.

CASTINGS.
(Semi-Steel.)
City Foundry Co., The, Cleveland, O.
Lake Erie Engineering Works, Buffalo, N. Y.
Lorain Casting Co., The, Lorain, O.
Mesta Machine Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.

CASTINGS.
(Steel.)
Acme Steel & Malleable Iron Wks., Buffalo, N. Y.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Bucyrus Steel Casting Co., Bucyrus, O.
Columbia Steel Co., Portland, Ore.
Hubbard Steel Foundry Co., E. Chicago, Ind.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
National Foundry Co., Erie, Pa.
Otis Steel Co., Ltd., Cleveland, O.
Pratt & Letchworth Co., Buffalo, N. Y.
Prime Steel Co., Milwaukee, Wis.
Racine Steel Castings Co., Racine, Wis.
Reliance Steel Castings Co., Pittsburg, Pa.
Sharon Foundry Co., Sharon, Pa.
Smith, Geo. H., Steel Castings Co., Milwaukee.
United Engineering & Fdy. Co., Pittsburg, Pa.
Urick Foundry Co., Erie, Pa.
West Steel Castings Co., Cleveland, O.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Youngstown Fdy. & Mch. Co., Youngstown, O.

CASTINGS.
(Steel, Car and Locomotive.)
Bucyrus Steel Casting Co., Bucyrus, O.
Mesta Machine Co., Pittsburg, Pa.
National Foundry Co., Erie, Pa.
Otis Steel Co., Ltd., Cleveland, O.
Pratt & Letchworth Co., Buffalo, N. Y.
Prime Steel Co., Milwaukee, Wis.

CASTINGS.
(Steel Converter.)
Columbia Steel Co., Portland, Ore.
West Steel Casting Co., Cleveland, O.

CASTINGS.
(Steel Electrical.)
Smith, Geo. H., Steel Castings Co., Milwaukee.
West Steel Casting Co., Cleveland, O.

CASTINGS.
(Stove Plate.)
Interstate Foundry Co., Cleveland, O.

CASTINGS.
(Vanadium.)
American Vanadium Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Prime Steel Co., Milwaukee, Wis.

CEMENT.
American Refractories Co., Chicago, Ill.
Universal Portland Cement Co., Chicago, Ill.

IMPROVEMENT

No. 4 DRILL—16 x 20 in. Head

"Twenty Holes Simultaneously, in Less Time Than Ever."

Another size machine has been added to the FOX line of Multiple Drills.

The No. 4 machine driven by **extra wide belt** and having **gear driven feed** to head is our latest production, machine built with 16 in. round, 16 x 20 in. or 16 x 30 in. rectangular heads.

Carries drills up to 1 in. diameter.

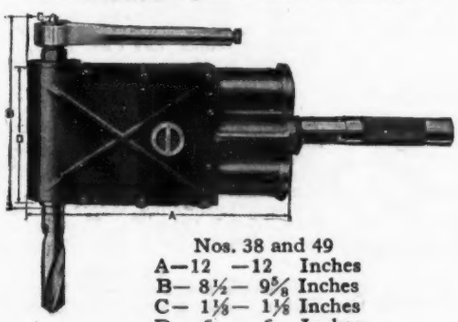
Write today for complete specifications.

FOX MACHINE CO.

18 Front St., Grand Rapids, Mich.
30 Church St., New York City.

Cleveland Corner Drill

FOR CLOSE QUARTER DRILLING



Nos. 38 and 49
A—12 —12 Inches
B— 8½— 9⅝ Inches
C— 1⅛— 1⅛ Inches
D— 6 — 6 Inches

The Cleveland Corner Drill is very simple in construction, having one third less number of parts than any similar type of drill, and is 3½ inches shorter in over-all length.

The body of drill is "one piece" and is provided with "hand-hole" opening, permitting of easy access to crank and connections. The drill sockets are made full length and will admit the entire shank of Standard Morse Taper Drill bits. **Machine shipped on approval.**

Write for Catalog "L"

Bowes' Air Hose Couplings

AIR TIGHT

Over 1,000,000 in general use.

The Cleveland Pneumatic Tool Co.

NEW YORK CLEVELAND, O. CHICAGO

"MORSE"

TWIST DRILLS
REAMERS
MILLING CUTTERS

Carbon and High Speed Steel

During the 48 years of our existence, the skill and knowledge of machinist tool making that we have gathered, the result of nearly half a century of study, are all applied to the manufacturing of "MORSE" Tools. The final result being that the manufacturer and actual user benefit by our experience and care. They will find "MORSE" tools are easily driven, will remove the maximum of stock and do good work, in every way satisfactory.

Morse Twist Drill & Machine Co.

NEW BEDFORD, MASS.

WHERE TO BUY

CHAINS.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Morse Chain Co., Ithaca, N. Y.
Steel Car Forge Co., Pittsburg, Pa.

CHAPLETS.
Champion Machine & Forging Co., Cleveland, O.
Cheney & Son, S., Manlius, N. Y.

CHARCOAL.
Hillman, J. H., & Son, Pittsburg, Pa.

CHEMICALS. (General.)
General Chemical Co., Cleveland, O.

CHEMISTS. (Analytical.)
Dover Laboratory, Dover, N. J.

CHIMNEYS.
Kennicott Co., Chicago, Ill.

CLAMPS.
Starrett, L. S., Co., Athol, Mass.

CLAY.
(Fire Ground.)
Harbison-Walker Refractories Co., Pittsburg, Pa.
Pyro Clay Products Co., Oak Hill, O.
Robertson & Son, New Brighton, Pa.
Union Mining Co., Mt. Savage, Md.

CLUTCHES. (Magnetic.)
Cutler-Hammer Clutch Co., Milwaukee, Wis.

COAL AND COKE.
Addy, Matthew, & Co., Cincinnati, O.
Baird & West, Detroit, Mich.
Bourne-Fuller Co., Cleveland, O.
Columbus Iron & Steel Co., Columbus, O.
Debevoise-Anderson Co., New York City.
Eaton, Rhodes & Co., Cincinnati, O.
Hanna, M. A., & Co., Cleveland, O.
Hillman, J. H., & Son, Pittsburg, Pa.
LaBelle Iron Works Co., Steubenville, O.
McKeefrey & Co., Leetonia, O.
Mohr, J. J., & Son, Philadelphia, Pa.
Phelps Iron & Steel Co., Cincinnati, O.
Pickands, Brown Co., Chicago, Ill.
Pittsburg-Westmoreland Coal Co., Pittsburg, Pa.
Rainey, W. J., New York City.
Rogers, Brown & Co., Cincinnati, O.
Semet Solvay Co., Detroit, Mich.
Wallingford, Walter & Co., Cincinnati, O.
Washington Coal & Coke Co., Pittsburg, Pa.

COILS.
(Armature and Field.)
Van Dorn & Dutton Co., Cleveland, O.

COILS.
(Pipe.)
National Tube Co., Pittsburg, Pa.
Samuel, Frank, Philadelphia, Pa.
Snyder & Co., W. P., Pittsburg, Pa.
Stewart Iron Co., Ltd., Cleveland, O.
Tennessee Coal, Iron & R. R. Co., B'rm'g'm, Ala.
Walter-Wallingford & Co., Cincinnati, O.
Washington Coal & Coke Co., Pittsburg, Pa.

COKE PUSHERS.
Koppers, H., Joliet, Ill.

COMPRESSORS.
(Air.)
American Compressor & Pump Co., Baltimore.
Baird Machinery Co., Pittsburg, Pa.
Cameron Steam Pump Wks., New York.
Dean Bros. Steam Pump Wks., Indianapolis, Ind.
Deming Co., Salem, O.
Ingersoll-Rand Co., New York.
Mesta Machine Co., Pittsburg, Pa.
Norwalk Iron Works Co., So. Norwalk, Conn.

COMPRESSORS.
(Gas.)
Ingersoll-Rand Co., New York.
Norwalk Iron Works Co., So. Norwalk, Conn.

CONDENSERS. (Steam.)
Cameron Steam Pump Works, New York.
Cooper, C. & G., Co., Mt. Vernon, O.
Dean Bros. Steam Pump Wks., Indianapolis.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
McGowan, J. H., Co., Cincinnati, O.
Mesta Machine Co., Pittsburg, Pa.
Prescott Steam Pump Co., Milwaukee, Wis.

CONSTRUCTION.
(By-Products Coke Ovens.)
Koppers, H., Joliet, Ill.

CONSTRUCTION.
(Concrete.)
Kratzer, W. N., & Co., Pittsburg, Pa.

CONSTRUCTION.
(Steel and Iron.)
American Bridge Co. of New York, N. Y.
Bellefontaine Bridge & Steel Co., Bellefontaine, O.
Freeman, S., & Sons Mfg. Co., Racine, Wis.
Kennicott Co., Chicago, Ill.
Kratzer, W. N., & Co., Pittsburg, Pa.
McMyler Interstate Co., Cleveland, O.
Meehan Boiler & Const. Co., Lowellville, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Sharon Boiler Works, Sharon, Pa.

CONSTRUCTION.
(Steel Plate.)
Graver Tank Works, The Wm., Chicago, Ill.
Knox Pressed & Welded Steel Co., Pittsburg, Pa.

CONTRACTORS.
(Gas Engine Power Plants.)
Bogart Gas Power Engrg. Co., Buffalo, N. Y.

CONTRACTORS.
(Piping.)
Pittsburg Piping & Equipment Co., Pittsburg.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.

CONTROLLERS.
Allen, John F., Co., New York City.
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

CONTROLLERS.
(Boiler Feed and Open Heater Feed.)
Strong, Carlisle & Hammond Co., Cleveland, O.

CONTROLLERS.
(Crane.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
Toledo Bridge & Crane Co., Toledo, O.
Westinghouse Electric & Mfg. Co., Pittsburg.

CONTROLLERS.
(Electric.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
Westinghouse Electric & Mfg. Co., Pittsburg.

CONVERTERS.
(Steel Casting.)
Whiting Foundry Equip. Co., Harvey, Ill.

CONVEYOR BRIDGES.
(Ore and Coal.)
Andresen-Evans Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, O.

CONVEYORS.
Bartlett, C. O., & Snow Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
McMyler Interstate Co., Cleveland, O.

COUNTER SHAFTS.
(Variable Speed.)
Norton Co., Worcester, Mass.

COUPLINGS.
Bradley, C. C. & Son, Syracuse, N. Y.
Jones & Laughlin Steel Co., Pittsburg, Pa.
National Tube Co., Pittsburg, Pa.

COUPLINGS. (Flexible.)
Electric Controller & Mfg. Co., Cleveland, O.

CRANES.
(Bucket.)
Alliance Machine Co., The, Alliance, O.

CRANES. (Charging.)
Alliance Machine Co., Alliance, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Morgan Engineering Co., Alliance, O.
Pawling & Harnischfeger Co., Milwaukee, Wis.

CRANES (Electric).
Brown Hoisting Machinery Co., Cleveland, O.

CRANES.
(Electric Traveling.)
Alliance Machine Co., Alliance, O.
Browning, Victor R., Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Industrial Works, Bay City, Mich.
Manning, Maxwell & Moore, New York City.
McMyler Interstate Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York, N. Y.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Ridgway, Craig & Son, Coatesville, Pa.
Shaw Electric Crane Co., New York, N. Y.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Toledo Bridge & Crane Co., Toledo, O.
Wellman-Seaver-Morgan Co., Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES. (Gantry.)
Alliance Machine Co., Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
McMyler Interstate Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York, N. Y.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Toledo Bridge & Crane Co., Toledo, O.

CRANES.
(Grab Bucket.)
Brown Hoisting Machinery Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Northern Engineering Works, Detroit, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Toledo Bridge & Crane Co., Toledo, O.
Whiting Foundry Equip. Co., Harvey, Ill.

CRANES.
(Hand Traveling.)
Browning, Victor R., Co., Cleveland, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Euclid Crane & Hoist Co., Euclid, O.
Niles-Bement-Pond Co., New York, N. Y.
Northern Engineering Works, Detroit, Mich.
Toledo Bridge & Crane Co., Toledo, O.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES (Hand Trolley).
Brown Hoisting Machinery Co., Cleveland, O.

CRANES.
(Hydraulic.)
Alliance Machine Co., Alliance, O.
Morgan Engineering Co., Alliance, O.

CRANES.
(Ingot Stripper.)
Alliance Machine Co., The, Alliance, O.
Pawling & Harnischfeger Co., Milwaukee, Wis.

CRANES.
(Jib.)
Alliance Machine Co., Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Chisholm & Moore Mfg. Co., Cleveland, O.
Euclid Crane & Hoist Co., Euclid, O.
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York, N. Y.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Ridgway, Craig & Son, Coatesville, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

CRANES.
(Locomotive.)
Brown Hoisting Machinery Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, O.
Morgan Engineering Co., Alliance, O.
Northern Engineering Works, Detroit, Mich.
Ohio Locomotive Crane Co., Bucyrus, O.
Wellman-Seaver-Morgan Co., Cleveland, O.

CRANES.
(Pneumatic.)
Detroit Hoist & Mach. Co., Detroit, Mich.
Industrial Works, Bay City, Mich.
Northern Engineering Works, Detroit, Mich.

CRANES.
(Special.)
Alliance Machine Co., The, Alliance, O.
Brown Hoisting Machinery Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Morgan Engrg. Co., Alliance, O.
Niles-Bement-Pond Co., New York, N. Y.
Northern Engineering Works, Detroit, Mich.
Shaw Electric Crane Co., New York, N. Y.
United Engineering & Fdy. Co., Pittsburg, Pa.

CRANES.
(Steam and Pneumatic, Wire Mills.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

CRAYONS.
(Metal Marking.)
Korn, Wm., 120-R Centre St., New York City.

CRUCIBLES.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

CUPOLAS.
Northern Engineering Works, Detroit, Mich.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

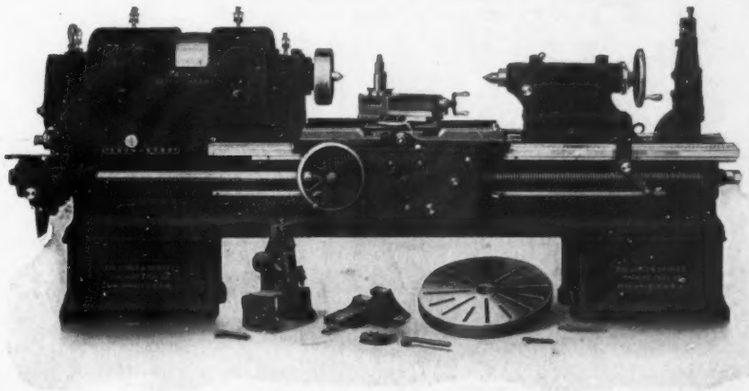
CUPRO.
(Vanadium.)
American Vanadium Co., Pittsburg.

CUTTERS.
Landis Tool Co., Waynesboro, Pa.

CUTTERS.
(Coal.)
Ingersoll-Rand Co., New York.

CUTTERS.
(Sprue.)
Bliss, E. W., Co., Brooklyn, N. Y.
Shuster Co., F. B., New Haven, Conn.
Shepard Electric Crane & Hoist Co., Montour Falls, N. Y.
Toledo Machine & Tool Co., Toledo, O.

Well-Balanced Design



Why put great power into a lathe headstock if you cannot fully utilize it on account of light construction elsewhere? Yet during the past few years attention in lathe design has been directed principally toward the improvement of headstocks.

When we adopted the "Patent Headstock," with its immense power possibilities, we found it necessary to proportionately strengthen the other parts of the lathe. We made the bed wider and deeper; substituted drop forged steel for cast iron in the feed gears; gave the carriage more bearing upon the bed; strengthened the apron; shortened and widened the bridge; doubled the weight of the tailstock and provided additional means of securing it in position.

The Patent Head Lathe as a whole has kept pace with the improvement of the headstock.

The Lodge & Shipley Machine Tool Company

CINCINNATI, OHIO, U. S. A.

LE BLOND

MILLERS

THE PACE MAKERS

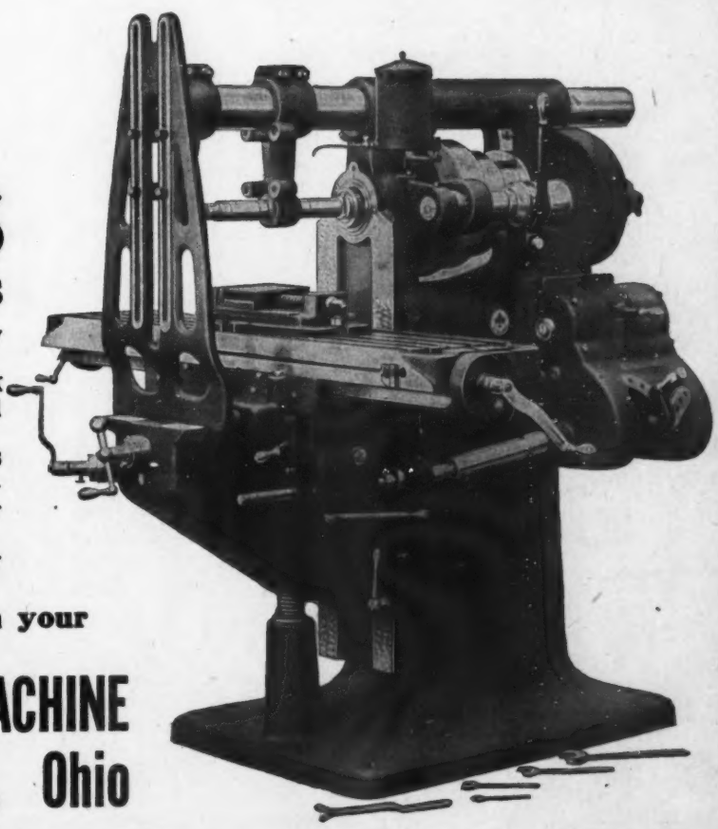
Greater Driving Power than any other cone type miller built.

Fitted with **double friction back gears,** giving **instantaneous** speed changes.

Feed driven with **spur gears throughout, eliminating** the frictional losses found in other miller mechanisms.

Great rigidity enabling the operator to take advantage of these features.

Let a LeBlond set the pace in your milling department



THE R. K. LeBLOND MACHINE TOOL CO., Cincinnati, Ohio

WHERE TO BUY

CUTTING.
(Gear.)
Newton Mach. Tool Wks., Inc., Philadelphia.

CUTTING.
(Oxy-Acetylene Process.)
Davis Bournonville Co., New York City.
International Oxygen Co., New York City.

CYLINDERS.
National Tube Co., Pittsburg, Pa.

CYLINDERS.
(Vanadium.)
American Vanadium Co., Pittsburg, Pa.

DAUBING.
(Cupola.)
Harbison-Walker Refractories Co., Pittsburg, Pa.

DIES.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Waynesboro, Pa.
Long & Allstatter Co., Hamilton, O.
Sterling Machine & Stamping Co., The, Wellington, O.

DIE-PLATES AND WORLDES.
(Steel, Wire Mills.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

DREDGES.
Bucyrus Co., The, South Milwaukee, Wis.
Thew Automatic Shovel Co., Lorain, O.

DRESSERS.
(Emery Wheel.)
Norton Co., Worcester, Mass.

DRILLS.
(Electric.)
Van Dorn & Dutton Co., Cleveland, O.

DRILLS.
(Pneumatic.)
Allen, John F., Co., New York City.
Cleveland Pneumatic Tool Co., Cleveland, O.
Ingersoll-Rand Co., New York.

DRILLS.
(Portable.)
Newton Mch. Tool Wks., Inc., Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, O.

DRILLS.
(Rock.)
Ingersoll-Rand Co., New York.

DRILLS.
(Twist.)
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Ryerson, Jos. T., & Son, Chicago, Ill.
Ward & Sons, Edgar T., Boston, Mass.

DRIVERS.
(Pile.)
Industrial Works, Bay City, Mich.

DYNAMOS.
Holt Electric Co., Milwaukee, Wis.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

ELECTRICAL EQUIPMENT.
(Second Hand.)
Buckeye Equipment Co., Cincinnati, O.
Gregory Electric Co., Chicago, Ill.
McCoy & Brandt, Pittsburg, Pa.
Miller-Owen Electric Co., Pittsburg, Pa.

ELECTRICAL INSTRUMENTS.
(Repaired and Tested.)
Stupakoff, S. H., Pittsburg, Pa.

ELEVATORS.
Jeffrey Mfg. Co., Columbus, O.
Ridgway, Craig, & Son, Coatesville, Pa.

ENGINEERS AND CONTRACTORS.
American Bridge Co. of New York, N. Y.
Bellefontaine Bridge & Steel Co., Bellefontaine, O.
Blair Engineering Co., Chicago, Ill.
Bucyrus Steel Casting Co., Bucyrus, O.
Kennedy, Julian, Pittsburg, Pa.
Koppers, H., Joliet, Ill.
Lackawanna Bridge Co., Buffalo, N. Y.
Ladd & Baker, Philadelphia, Pa.
Lake Erie Engineering Works, Buffalo, N. Y.
Laughlin, Alex., & Co., Pittsburg, Pa.
McClintic-Marshall Const. Co., Pittsburg, Pa.
McClure, Son & Co., Pittsburg, Pa.
McKee, Arthur G., Cleveland, O.
Morgan Engineering Co., Alliance, O.
Osborn Engineering Co., Cleveland, O.
Rakowsky, Victor, Duluth, Minn.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Rockwell Furnace Co., New York City.
Schlieper & Daae, Pittsburgh, Pa.
Smythe, S. R., Co., Pittsburg, Pa.
Swindell, Wm., & Bros., Pittsburg, Pa.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.
Union Fdy. & Mach. Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Worden-Allen Co., Chicago, Ill.
Wright-Hall Engineering Co., Chicago, Ill.

ENGINEERS AND CONTRACTORS.
(By-Products Coke Ovens.)
Koppers, H., Joliet, Ill.

ENGINEERS.
(Foundry.)
Wright-Hall Engineering Co., Chicago, Ill.

ENGINES.
(Blowing.)
Hooven, Owens, Rentschler Co., Hamilton, O.
Tod Co., Wm., Youngstown, O.

ENGINES.
(Gas and Gasoline.)
Bogart Gas Power Engrg. Co., Buffalo, N. Y.
Buckeye Engine Co., Salem, O.
Cooper, C. & G., Co., Mt. Vernon, O.
Mesta Machine Co., Pittsburg, Pa.
Struthers-Wells Co., Warren, Pa.
Tod Co., Wm., Youngstown, O.

ENGINES.
(Hoisting.)
Cooper, C. & G., Co., Mt. Vernon, O.
Vulcan Iron Works, Wilkesbarre, Pa.

ENGINES.
(Pneumatic.)
Detroit Hoist & Machine Co., Detroit, Mich.

ENGINES.
(Pumping.)
Hooven, Owens, Rentschler Co., Hamilton, O.
Tod Co., Wm., Youngstown, O.

ENGINES. (Steam.)
American Blower Co., Detroit, Mich.
Buckeye Engine Co., Salem, O.
Cooper, C. & G., Co., Mt. Vernon, O.
Hooven, Owens, Rentschler Co., Hamilton, O.
Lake Erie Engineering Works, Buffalo, N. Y.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Southwark Fdy. & Mch. Co., Philadelphia, Pa.
Struthers-Wells Co., Warren, Pa.
Tod Co., Wm., Youngstown, O.

EQUIPMENT.
(By-Products Coke Oven.)
Koppers, H., Joliet, Ill.

EQUIPMENT.
(Railroad.)
Hyman-Michaels Co., The, Chicago, Ill.

EQUIPMENT.
(Rolling Mill.)
Bucyrus Steel Casting Co., The, Bucyrus, O.
Tod Co., Wm., Youngstown, O.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.

EQUIPMENT.
(Welded Chain, Wire and Wire Nail Mills—Complete.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

EXTRACTORS.
(Steam or Oil.)
Strong, Carlisle & Hammond Co., Cleveland, O.

FACINGS.
(Foundry.)
Dixon, Jos., Crucible Co., Jersey City, N. J.
Obermayer, S., Co., Cincinnati, O.
Stevens, F. B., Detroit, Mich.

FANS.
(Exhaust and Ventilating.)
American Blower Co., Detroit, Mich.
Sirocco Engineering Co., Detroit, Mich.

FENCE.
(Woven Wire.)
Cambria Steel Co., Johnstown, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

FERRO-MANGANESE.
Addy, Matthew & Co., Cincinnati, O.
Blackwell & Sons, Ltd., Liverpool, Eng.
Mohr, J. J., & Son, Philadelphia, Pa.
Pickands, Brown & Co., Chicago, Ill.
Rogers, Brown & Co., Cincinnati, O.
Samuel, Frank, Philadelphia, Pa.

FERRO-SILICON.
Addy, Matthew & Co., Cincinnati, O.
Blackwell & Sons Co., Ltd., Liverpool, Eng.
Mohr, J. J., & Son, Philadelphia, Pa.
Pickands, Brown & Co., Chicago, Ill.
Rogers, Brown & Co., Cincinnati, O.
Samuel, Frank, Philadelphia, Pa.
Tennessee Coal, Iron & R. R. Co., B'm'g'm, Ala.

FERRO.
(Vanadium.)
American Vanadium Co., Pittsburg, Pa.

FILES.
Barnett, G. & H., Co., Philadelphia, Pa.
Disston & Sons, Inc., Henry, Philadelphia, Pa.
Nicholson File Co., Providence, R. I.

FITTINGS.
(Pipe.)
Flagg, Stanley G., & Co., Philadelphia, Pa.
Illinois Malleable Iron Co., Chicago, Ill.
National Tube Co., Pittsburg, Pa.
Pittsburg Piping & Equipment Co., Pittsburg.
United Engineering & Fdy. Co., Pittsburg, Pa.

FLANGES.
Dart, E. M., Mfg. Co., Providence, R. I.
Hubbard Steel Foundry Co., East Chicago, Ind.
Kennicott Co., Chicago, Ill.
National Tube Co., Pittsburg, Pa.
Sundberg Co., J. A., Chicago, Ill.

FLOORING.
(Bridge.)
Youngstown Iron & Steel Co., Youngstown, O.

FLUES.
Kennicott Co., Chicago, Ill.

FLUOR-SPAR.
Addy, Matthew & Co., Cincinnati, O.
Obermayer, S., Co., Cincinnati, O.
Rogers, Brown & Co., Cincinnati, O.

FLY WHEELS.
Jones & Laughlin Steel Co., Pittsburg, Pa.

FORGINGS.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Anderson Forge & Mach. Co., Detroit, Mich.
Carnegie Steel Co., Pittsburg, Pa.
Champion Machine & Forging Co., Cleveland.
Columbus Forge & Iron Co., Columbus, O.
Ellwood City Forge Co., Ellwood City, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingalls-Shepard Forging Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Michigan Bolt & Nut Wks., Detroit, Mich.
Otis Steel Co., Ltd., Cleveland, O.
Pollak Steel Co., The, Cincinnati, O.
Steel Car Forge Co., Pittsburg, Pa.
Sundberg, Kropp & Co., Chicago, Ill.
Superior Drop Forge & Mfg. Co., Cleveland.
Union Mfg. & Drop Forge Co., Providence, R.I.

FORGINGS.
(Auto.)
Anderson Forge & Mach. Co., Detroit, Mich.
General Drop Forge Co., Buffalo, N. Y.
Michigan Bolt & Nut Wks., Detroit, Mich.
Sundberg, Kropp & Co., Chicago, Ill.

FORGINGS.
(Copper and Alloy Steel.)
Anderson Forge & Mach. Co., Detroit, Mich.
Wyman & Gordon Co., Cleveland, O., and Worcester, Mass.

FORGINGS.
(Car and Locomotive.)
American Iron & Steel Mfg. Co., Lebanon, Pa.
Cambria Steel Co., Johnstown, Pa.
Cleveland City Forge & Iron Co., Cleveland.
Oliver Iron & Steel Co., Pittsburg, Pa.
Steel Car Forge Co., Pittsburg, Pa.

FORGINGS.
(Drop.)
Anderson Forge & Machine Co., Detroit, Mich.
Champion Machine & Forging Co., Cleveland.
Columbus Forge & Iron Co., Columbus, O.
General Drop Forge Co., Buffalo, N. Y.
Ingalls-Shepard Forge Co., Chicago, Ill.
Michigan Bolt & Nut Wks., Detroit, Mich.
Oliver Iron & Steel Co., Pittsburg, Pa.
Steel Car Forge Co., Pittsburg, Pa.
Superior Drop Forge & Mfg. Co., Cleveland.
Transue & Williams Co., Alliance, O.
Union Mfg. & Drop Forge Co., Providence, R.I.
Wyman & Gordon Co., Cleveland, O., and Worcester, Mass.

FORGINGS.
(Steel.)
Ellwood City Forge Co., Ellwood City, Pa.

FORGINGS.
(Vanadium.)
American Vanadium Co., Pittsburg, Pa.

FOUNDRY EQUIPMENT AND SUPPLIES.
(Iron and Brass.)
Northern Engineering Works, Detroit, Mich.
Obermayer Co., The S., Cincinnati, O.
Paxson, J. W., Co., Philadelphia, Pa.
Sly Mfg. Co., W. W., Cleveland, O.
Stevens, F. B., Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.

FRONTS.
(Furnace.)
Brown Improved Furnace Front Co., Brackenridge, Pa.

FURNACES.
American Stoker Co., New York, N. Y.

FURNACES.
(Annealing.)
Hagan, George J., Pittsburg, Pa.
Swindell & Bros., Wm., Pittsburg, Pa.

FURNACES.
(Blast.)
Ladd & Baker, Philadelphia, Pa.
Lake Erie Engrg. Works, Buffalo, N. Y.
McClure, Son & Co., G. W., Pittsburg, Pa.
McKee, Arthur G., Cleveland, O.
Meehan Boiler & Constn. Co., Lowellville, O.
Mesta Machine Co., Pittsburg, Pa.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Smythe Co., S. R., House Bldg., Pittsburg, Pa.
Southwark Fdy. & Mach. Co., Philadelphia, Pa.
Strong, Carlisle & Hammond Co., Cleveland, O.
Wellman-Seaver-Morgan Co., Cleveland, O.

FURNACES.
(Brass and Copper Melting.)
Rockwell, W. S., Co., New York City.
Strong, Carlisle & Hammond Co., Cleveland, O.

FURNACES.
(Crucible.)
Laughlin & Co., Alex., Pittsburg, Pa.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York, N. Y.
Strong, Carlisle & Hammond Co., Cleveland, O.

FURNACES.
(Electrically Heated.)
Bristol Co., Waterbury, Conn.
Strong, Carlisle & Hammond Co., Cleveland, O.

FURNACES.
(Forging.)
Strong, Carlisle & Hammond Co., Cleveland, O.

FURNACES.
(Lead, Pot and Muffle Annealing, Wire Mills).
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

FURNACES.
(Malleable.)
Whiting Foundry Equip. Co., Harvey, Ill.

FURNACES.
(Melting.)
Rockwell Furnace Co., New York, N. Y.
Strong, Carlisle & Hammond Co., Cleveland, O.

FURNACES.
(Oil and Coke Crucible.)
Strong, Carlisle & Hammond Co., Cleveland, O.

FURNACES.
(Oil, Gas or Coke, Welded Chain Factories.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

FURNACES.
(Open Hearth.)
Knox Pressed & Welded Steel Co., Pittsburg, Pa.

FURNACES.
(Reheating.)
Morgan Construction Co., Worcester, Mass.

FURRING.
(Metal.)
Youngstown Iron & Steel Co., Youngstown, O.

GALVANIZING.
Empire Iron & Steel Co., Niles, O.

GASKETS.
Erbestos Brake Lining Co., Philadelphia, Pa.

GAUGES.
(Recording and Steam.)
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Philadelphia, Pa.

GEARS.
Bilgram Machine Works, Philadelphia, Pa.
Boston Gear Works, Norfolk Downs, Mass.
Bucyrus Steel Casting Co., The, Bucyrus, O.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Farrell Foundry & Mach. Co., Ansonia, Conn.
Fawcus Machine Co., Pittsburg, Pa.
Foote Bros. Gear & Mach. Co., Chicago, Ill.
Ganschow, Wm., Co., Chicago, Ill.
Gleason Wks., Rochester, N. Y.
Horsburgh & Scott Co., Cleveland, O.
Hubbard Steel Foundry Co., East Chicago, Ind.
Mesta Machine Co., Pittsburg, Pa.
New Process Rawhide Co., Syracuse, N. Y.
Nuttall, R. D., Co., Pittsburg, Pa.
Union Foundry & Machine Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Van Dorn & Dutton Co., Cleveland, O.

GEARS.
(Bevel.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Horsburgh & Scott Co., Cleveland, O.
Mesta Machine Co., Pittsburg, Pa.
New Process Rawhide Co., Syracuse, N. Y.
Nuttall, R. D., Co., Pittsburg, Pa.

GEARS.
(Cast Steel, Machine Molded.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Horsburgh & Scott Co., Cleveland, O.
Mesta Machine Co., Syracuse, N. Y.
Nuttall, R. D., Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.

GEARS.
(Cut.)
Boston Gear Works, Norfolk Downs, Mass.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Fawcus Machine Co., Pittsburg, Pa.
Ganschow, Wm., Co., Chicago, Ill.
Horsburgh & Scott Co., Cleveland, O.
Mesta Machine Co., Pittsburg, Pa.
New Process Rawhide Co., Syracuse, N. Y.
Nuttall, R. D., Co., Pittsburg, Pa.
Van Dorn & Dutton Co., Cleveland, O.

GEARS.
(Rawhide.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Ganschow, Wm., Co., Chicago, Ill.
Horsburgh & Scott Co., Cleveland, O.
New Process Rawhide Co., Syracuse, N. Y.
Nuttall, R. D., Co., Pittsburg, Pa.

GEARS.
(Vanadium.)
American Vanadium Co., Pittsburg, Pa.

GENERATORS.
(Direct and Alternating.)
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

GLASSES.
(Gage Boiler.)
Strong, Carlisle & Hammond Co., Cleveland, O.

GOVERNORS.
(Pump.)
Dean Bros. Steam Pump Wks., Indianapolis, Ind.

GRAPHITE.
Dixon Crucible Co., Jos., Jersey City, N. J.

GRATES.
American Stoker Co., New York, N. Y.

GRINDERS.
(Chain Die, Welded Chain Factories.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

GRINDERS.
(Nail Machine Knife, Wire Nail Mills.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

GRINDERS.
(Pneumatic.)
Cleveland Pneumatic Tool Co., Cleveland, O.

GRINDERS.
(Surface.)
Hemming Bros. Co., New Haven, Conn.

HAMMERS.
Ryerson, Joseph T., & Son, Chicago, Ill.

HAMMERS.
(Belt Driven.)
Bradley & Son, C. C., Syracuse, N. Y.

HAMMERS.
(Drop.)
Alliance Machine Co., Alliance, O.
Bliss, E. W., Co., Brooklyn, N. Y.
Chambersburg Engrg. Co., Chambersburg, Pa.
Carrison, A., Foundry Co., Pittsburg, Pa.
Massillon Fdy. & Mach. Co., Massillon, O.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Toledo Machine & Tool Co., Toledo, O.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Waterbury Farrel Fdy. & Mach. Co., Waterbury, Conn.

HAMMERS.
(Foot and Power, Welded Chain Factories.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

HAMMERS.
(Pneumatic.)
Cleveland Pneumatic Tool Co., Cleveland, O.
Ryerson, Joseph T., & Son, Chicago, Ill.

HAMMERS.
(Power.)
Beaudry & Co., Inc., Boston, Mass.
Bradley & Sons, C. C., Syracuse, N. Y.
Buffalo Fdy. & Mach. Co., Buffalo, N. Y.
Cleveland Punch & Shear Wks., Cleveland, O.
Massillon Fdy. & Mach. Co., Massillon, O.
Morgan Engineering Co., Alliance, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Toledo Mach. & Tool Co., Toledo, O.

HAMMERS.
(Steam.)
Buffalo Fdy. & Mach. Co., Buffalo, N. Y.
Chambersburg Engrg. Co., Chambersburg, Pa.
Massillon Fdy. & Mach. Co., Massillon, O.
Mesta Machine Co., Pittsburg, Pa.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.

HAMMERS.
(Steam Gravity Drop.)
Massillon Fdy. & Mach. Co., Massillon, O.

HANGERS.
Jones & Laughlin Steel Co., Pittsburg, Pa.

HEADS.
(Dished.)
Kennicott Co., Chicago, Ill.

HEATERS.
(Feed Water.)
Green Fuel Economizer Co., Matteawan, N. Y.

HOISTS.
(Chain.)
Chisholm & Moore Mfg. Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Dake Engine Co., Grand Haven, Mich.
Detroit Hoist & Mch. Co., Detroit, Mich.

HOISTS.
(Compressed Air Geared.)
Detroit Hoist & Machine Co., Detroit, Mich.
Ingersoll-Rand Co., New York.

HOISTS.
(Electric.)
Alliance Machine Co., Alliance, O.
Browning, Victor R., Co., Cleveland, O.
Cleveland Crane & Engrg. Co., Wickliffe, O.
Euclid Crane & Hoist Co., Euclid, O.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Northern Engineering Works, Detroit, Mich.
Pawling & Harnischfeger Co., Milwaukee, Wis.
Shepard Electric Crane & Hoist Co. Montour Falls, N. Y.
Toledo Bridge & Crane Co., Toledo, O.
Whiting Foundry Equipment Co., Harvey, Ill.

HOISTS.
(Pneumatic.)
Detroit Hoist & Machine Co., Detroit, Mich.
Northern Engineering Works, Detroit, Mich.
Ridgway, Craig, & Son, Coatesville, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

HOOPS.
(Steel.)
American Steel & Wire Co., Chicago, Ill.
Amer. Tube & Stamping Co., Bridgeport, Ct.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Pittsburg Steel Co., Pittsburg, Pa.
Scully Steel & Iron Co., Chicago, Ill.

HOSE.
(Pneumatic.)
Cleveland Pneumatic Tool Co., Cleveland, O.

INJECTORS.
Watson, N. A., Erie, Pa.

INSTRUMENTS.
(Electrical.)
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Philadelphia, Pa.

IRON.
(Basic—Bessemer—Malleable.)
Addy, Matthew, & Co., Cincinnati, O.
Pickands, Brown & Co., Chicago, Ill.

IRON.
(Cutting Apparatus.)
Newton Mach. Tool Wks., Inc., Philadelphia.

IRON.
(Forging.)
Bourne-Fuller Co., Cleveland, O.

IRON.
(Pig.)
Addy, Matthew, & Co., Cincinnati, O.
Baird & West, Detroit, Mich.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburg, Pa.
Columbus Iron & Steel Co., Columbus, O.
Corrigan, McKinney & Co., Cleveland, O.
Debevoise-Anderson Co., New York City.
Eaton, Rhodes & Co., Cincinnati, O.
Globe Iron Co., Jackson, O.
Hanna & Co., M. A., Cleveland, O.
Hillman & Son, J. H., Pittsburg, Pa.
Hyman-Michaels Co., The, Chicago, Ill.
Illinois Steel Co., Chicago, Ill.
LaBelle Iron Works, Steubenville, O.
Lea, & Co., J. Tatnall, Philadelphia, Pa.
McKeefrey & Co., Leetonia, O.
Mitchell-Diggins Iron Co., Cadillac, Mich.
Mohr, J. J., & Son, Philadelphia, Pa.
Perry Iron Co., Erie, Pa.
Pickands, Brown & Co., Chicago, Ill.
Pickands, Mather & Co., Cleveland, O.
Republic Iron & Steel Co., Pittsburg, Pa.
Rogers, Brown & Co., Cincinnati, O.
Samuel, Frank, Philadelphia, Pa.
Snyder Co., W. P., Pittsburg, Pa.
Stewart Iron Co., Ltd., Cleveland, O.
Superior Charcoal Iron Co., Grand Rapids, Mich.
Tennessee Coal, Iron & R. R. Co., B'm'g'm, Ala.
Thomas Furnace Co., Milwaukee, Wis.
Upson Nut Co., Cleveland, O.
Walter-Wallingford & Co., Cincinnati, O.

IRON.
(Staybolt.)
Bourne-Fuller Co., Cleveland, O.

IRON AND STEEL.
(Swedish.)
Scully Steel & Iron Co., Chicago, Ill.
Swedish Iron & Steel Corp'n, New York City.

IRON AND STEEL.
(Galvanized.)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
McCalla, Harold, Philadelphia, Pa.
Newport Rolling Mill Co., Newport, Ky.
Ryerson, Jos. T., & Son, Chicago, Ill.
Wood & Co., Alan, Philadelphia, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

IRON AND STEEL.
(Scrap.)
American Bridge Co. of New York, New York.
Bourne-Fuller Co., Cleveland, O.
Hyman-Michaels Co., The, Chicago, Ill.

JOINTS.
(Rail.)
Carnegie Steel Co., Pittsburg, Pa.
Hyman-Michaels Co., The, Chicago, Ill.
Lackawanna Steel Co., New York City.

WHERE TO BUY

KETTLES AND POTS.
(Galvanizing.)
Kennicott Co., Chicago, Ill.
Wilfong Iron Works Co., M. F., Philadelphia.

KEYS AND COTTERS.
(Machine.)
Standard Gauge Steel Co., Beaver Falls, Pa.

KEYSEATERS.
Baker Bros., Toledo, O.
Mitts & Merrill, Saginaw, Mich.

LADLES.
Industrial Car Co., West Park, O.
Kennicott Co., Chicago, Ill.
Northern Engineering Wks., Detroit, Mich.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Whiting Fdy. & Equipment Co., Harvey, Ill.

LAMPS.
(Arc.)
Adams-Bagnall Electric Co., Cleveland, O.
Benjamin Electric Mfg. Co., Chicago, Ill.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

LAMPS.
(Electric.)
Adams-Bagnall Electric Co., Cleveland, O.
Benjamin Electric Mfg. Co., Chicago, Ill.

LAMPS.
(Incandescent.)
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

LATH.
(Expanded.)
American Rolling Mill Co., Middletown, O.
Youngstown Iron & Steel Co., Youngstown, O.

LATH.
(Metal.)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.

LATHES.
Baird Machinery Co., Pittsburg, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Fox Machine Co., Grand Rapids, Mich.
Jones & Lamson Mach. Co., Springfield, Vt.
Le Blond Machine Tool Co., R. K., Cincinnati.
Lodge & Shipley Mach. Tool Co., Cincinnati.
Manning, Maxwell & Moore, Inc., New York.
McCabe, J. J., New York City.
Motch & Merryweather Mach. Co., Cleveland.
Niles-Bement-Pond Co., New York City.
Ryerson, Joseph T., & Son, Chicago, Ill.
Schumacher & Boye, Cincinnati, O.

LATHES.
(Screw Cutting.)
Schumacher & Boye, Cincinnati, O.

LATHES.
(Axle.)
Schumacher & Boye, Cincinnati, O.

LATHES. (Turret.)
New Britain Mach. Co., The, New Britain, Conn.
Schumacher & Boye, Cincinnati, O.

LEATHER.
(Lace.)
Chicago Rawhide Mfg. Co., Chicago, Ill.

LINE MATERIAL.
(Telegraph and Telephone.)
Inland Steel Co., Chicago, Ill.
National Tube Co., Pittsburg, Pa.

LININGS.
(Brake.)
Erbestos Brake Lining Co., Philadelphia, Pa.

LININGS.
(Cupola.)
Harbison-Walker Refractories Co., Pittsburg, Pa.
Louisville Fire Brick Wks., Highland Park, Ky.
Stevens, Frederic B., Detroit, Mich.

LININGS.
(Forge and Furnace.)
Ashland Fire Brick Co., Ashland, Ky.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Pyro Clay Products Co., Oak Hill, O.

LININGS.
(Friction Clutch.)
Erbestos Brake Lining Co., Philadelphia, Pa.

LININGS. (Ladle.)
Pyro Clay Products Co., Oak Hill, O.

LOCOMOTIVES.
(Electric.)
Westinghouse Electric & Mfg. Co., Pittsburg.

LOCOMOTIVES.
(Industrial.)
Vulcan Iron Works, Wilkesbarre, Pa.

LUMBER.
(Boxing and Crating.)
Johnson Lumber Co., Milwaukee, Wis.

LUMBER.
(Flask and Pattern.)
Johnson Lumber Co., Milwaukee, Wis.

MACHINERY.
American Stoker Co., New York, N. Y.

MACHINERY.
(Automatic Gear Cutting.)
Motch & Merryweather Machy. Co., Cleveland.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Barb Wire Fence, Barb Nail Wire, Wire Mills.)
Turner, Vaughn & Taylor Co., Cuy'hoga Falls, O.

MACHINERY.
(Bending and Straightening.)
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland.
Covington Machine Co., Covington, Va.
Dreis & Krump Mfg. Co., Chicago, Ill.
Espen-Lucas Wks., Philadelphia, Pa.
Long & Allstatter Co., Hamilton, O.
Mesta Machine Co., Pittsburg, Pa.
Morgan Engineering Co., Alliance, O.
Toledo Machine & Tool Co., Toledo, O.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Watson-Stillman Co., New York, N. Y.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Wire Specialty Works, South Bend, Ind.
Youngstown Fdy. & Mchy. Co., Youngstown, O.

MACHINERY.
(Blue Printing.)
Buckeye Engine Co., Salem, O.

MACHINERY.
(Bolt and Nut.)
Baird Machinery Co., Pittsburg, Pa.
Landis Machine Co., Waynesboro, Pa.
National Mach. Co., Tiffin, O.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Williams Tool Co., Erie, Pa.

MACHINERY.
(Boring and Turning.)
Baker Bros., Toledo, O.
Espen-Lucas Mach. Works, Philadelphia, Pa.
McCabe, J. J., New York City.
Mitts & Merrill, Saginaw, Mich.
Motch & Merryweather Machy. Co., Cleveland.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Niles-Bement-Pond Co., New York City.
Warner & Swasey Co., Cleveland, O.

MACHINERY.
(Buckle Tongue.)
Adt & Son, John, New Haven, Conn.

MACHINERY.
(Butt Drilling and Milling.)
Adt & Son, John, New Haven, Conn.

MACHINERY.
(By-Products Coke Oven.)
Koppers, H., Joliet, Ill.

MACHINERY.
(Cement.)
Vulcan Iron Works, Wilkesbarre, Pa.

MACHINERY.
(Centrifugal.)
Koppers, H., Joliet, Ill.

MACHINERY.
(Coil and Trace Chain, Welded Chain Factories.)
Turner, Vaughn & Taylor Co., Cuy'hoga Falls, O.

MACHINERY.
(Coke Ovens.)
Koppers, H., Joliet, Ill.

MACHINERY.
(Coping.)
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Cotter Pin.)
Shuster Co., F. B., New Haven, Conn.

MACHINERY.
(Crushing.)
Bartlett & Snow Co., C. O., Cleveland, O.

MACHINERY.
(Cutlery Grinding.)
Hemming Bros. Co., New Haven, Conn.

MACHINERY.
(Cutting Off—Cold Metal.)
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland.
Espen-Lucas Mach. Works, Philadelphia, Pa.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

MACHINERY.
(Drilling.)
Baker Bros., Toledo, O.
Baush Machine Tool Co., Springfield, Mass.
Fox Machine Co., Grand Rapids, Mich.
Manning, Maxwell & Moore, Inc., New York.
Massillon Fdy. & Mach. Co., Massillon, O.
McCabe, J. J., New York City.
Motch & Merryweather Mchy Co., Cleveland.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Niles-Bement-Pond Co., New York City.

MACHINERY.
(Drilling and Boring, Horizontal.)
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Pawling & Harnischfeger Co., Milwaukee, Wis.

MACHINERY.
(Drilling, Multiple.)
Baush Machine Tool Wks., Inc., Phila., Pa.
Fox Machine Co., Grand Rapids, Mich.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Drilling, Sensitive and Upright.)
Fox Machine Co., Grand Rapids, Mich.

MACHINERY.
(Drilling, Radial.)
Baush Machine Tool Wks., Inc., Phila., Pa.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Electric Welding.)
Toledo Electric Welder Co., The, Cincinnati.

MACHINERY.
(Elevating and Conveying.)
Bartlett & Snow Co., C. O., Cleveland, O.
Brown Hoisting Machinery Co., Cleveland, O.
Jeffrey Mfg. Co., Columbus, O.
McMyler Interstate Co., Cleveland, O.
Vulcan Iron Works, Wilkesbarre, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.

MACHINERY.
(Forging.)
Bliss Co., E. W., Brooklyn, N. Y.
Morgan Engineering Co., Alliance, O.
Tod Co., Wm., Youngstown, O.
Toledo Machine & Tool Co., Toledo, O.
United Engrg. & Fdy. Co., Pittsburg, Pa.

MACHINERY.
(Gear Cutting.)
Cincinnati Gear Cutting Mach. Co., Cincinnati
Cincinnati Shaper Co., Cincinnati, O.
Gleason Works, Rochester, N. Y.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Ward & Sons, Edgar T., Boston, Mass.

MACHINERY.
(Grinding.)
Landis Tool Co., Waynesboro, Pa.
Motch & Merryweather Machy. Co., Cleveland
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Norton Co., Worcester, Mass.

MACHINERY.
(Hydraulic.)
Chambersburg Engrg. Co., Chambersburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Tod Co., Wm., Youngstown, O.
United Engrg. & Fdy. Co., Pittsburg, Pa.

MACHINERY.
(Milling.)
Cincinnati Milling Mach. Co., Cincinnati, O
Espen-Lucas Mach. Works, Philadelphia, Pa.
Foote Bros. Gear & Mach. Co., Chicago, Ill.
Fox Machine Co., Grand Rapids, Mich.
LeBlond Mach. Tool Co., R. K., Cincinnati, O.
McCabe, J. J., New York City.
Motch & Merryweather Mach. Co., Cleveland.
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.
Niles-Bement-Pond Co., New York City.
Warner & Swasey Co., Cleveland, O.

MACHINERY.
(Mining.)
Lake Erie Engineering Works, Buffalo, N. Y.
McMyler Interstate Co., Cleveland, O.
Prescott Steam Pump Wks., Milwaukee, Wis.
Thew Automatic Shovel Co., Lorain, O.

MACHINERY.
(Molding.)
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

MACHINERY.
(Nut Facing.)
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY.
(Pipe Mill.)
Fox Machine Co., Grand Rapids, Mich.
Landis Machine Co., Waynesboro, Pa.
Standard Engineering Co., Ellwood City, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
United Engineering & Fdy. Co., Pittsburg.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.

MACHINERY.
(Planing.)
Newton Mach. Tool Wks., Inc., Philadelphia, Pa.

MACHINERY. (Riveting.)
Hemming Bros. Co., New Haven, Conn.

MACHINERY.
(Rolling Mill.)
Alliance Machine Co., Alliance, O.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Bucyrus Steel Casting Co., Bucyrus, O.
Farrel Foundry & Mch. Co., Ansonia, Conn.
Fawcus Machine Co., Pittsburg, Pa.
Garrison, A., Foundry Co., Pittsburg, Pa.
Hyde Park Fdy. & Mch. Co., Hyde Park, Pa.
Johnston & Jennings Co., Cleveland, O.
Lake Erie Engineering Works, Buffalo, N. Y.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., Alliance, O.
Newbold, R. S., & Son Co., Norristown, Pa.
Standard Engineering Co., Ellwood City, Pa.
Tod Co., Wm., Youngstown, O.
Union Fdy. & Mach. Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Waterbury Farrel Fdy. & Mch. Co., Wat'bry, Ct.
Wellman-Seaver-Morgan Co., Cleveland, O.
Wheeling Mold & Fdy. Co., Pittsburg, Pa.
Youngstown Fdy. & Mch. Co., Youngstown, O.

MACHINERY.
(Screw, Automatic.)
Cook Co., The Asa S., Hartford, Conn.

MACHINERY.
(Second Hand.)
Baird Machinery Co., Pittsburg, Pa.
Caldwell Co., E. R., Bradford, Pa.
Casey, D. L., Mach. Co., Springfield, O.
Dorner Railway Equipment Co., Chicago, Ill.
Essley, E. L., Mach. Co., The, Chicago, Ill.
Hyman-Michaels Co., The, Chicago, Ill.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
McCabe, J. J., New York City.
Motch & Merryweather Mch. Co., Cleveland, O.
Niles-Bement-Pond Co., New York City.
Oakdale Iron Co., Chicago, Ill.
Pettler, P., & Son, Beaver Falls, Pa.
Ryerson, Jos. T., & Son, Chicago, Ill.
Stewart Co., Paul, Cincinnati, O.
Strong, Carlisle & Hammond, Cleveland, O.
Toomey, Frank, Philadelphia, Pa.

MACHINERY.
(Sheet Metal Working.)
Bliss Co., E. W., Brooklyn, N. Y.
Dreis & Krump Mfg. Co., Chicago, Ill.

MACHINERY.
(Shovel.)
Toledo Machine & Tool Co., Toledo, O.

WHERE TO BUY

MACHINERY.
(Special.)
Bilgram Machine Works, Philadelphia, Pa.
Bliss Co., E. W., Brooklyn, N. Y.
Bucyrus Steel Casting Co., Bucyrus, O.
Fawcus Machine Co., Pittsburg, Pa.
Foote Bros. Gear & Machine Co., Chicago, Ill.
Franklin Mfg. Co., New Haven, Conn.
Johnston & Jennings Co., Cleveland, O.
Kilby Mfg. Co., Cleveland, O.
Long & Allstatter Co., Hamilton, O.
Manning, Maxwell & Moore, Inc., New York.
Merrill Bros., Brooklyn, N. Y.
Mesta Machine Co., Pittsburg, Pa.
Shuster Co., F. B., New Haven, Conn.
Tod Co., Wm., Youngstown, O.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Wire Specialty Works, South Bend, Ind.

MACHINERY.
(Spike and Nail.)
National Machinery Co., Tiffin, O.

MACHINERY.
(Staple.)
Adt & Son, John, New Haven, Conn.

MACHINERY.
(Tapping.)
Baker Bros., Toledo, O.

MACHINERY.
(Tin House.)
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Mesta Machine Co., Pittsburg, Pa.
Union Foundry & Machine Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Pittsburg, Pa.

MACHINERY.
(Wire Drawing, Wire and Rivet Works.)
Turner, Vaughn & Taylor Co., Cuy'hoga Falls, O.

MACHINERY.
(Wire.)
Shuster Co., F. B., New Haven, Conn.
Wire Specialty Works, South Bend, Ind.

MACHINERY.
(Wire Forming.)
Wire Specialty Works, South Bend, Ind.

MACHINERY.
(Wire Galvanizing, Wire Tinning, Wire Nails.)
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuy'hoga Falls, O.

MACHINERY.
(Wire Nails and Staples, Wire Nail Mills.)
Kilby Mfg. Co., Cleveland, O.
Turner, Vaughn & Taylor Co., Cuy'hoga Falls, O.

MACHINERY.
(Wood Working.)
Fox Machine Co., Grand Rapids, Mich.

MAGNESITE.
American Refractories Co., Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg, Pa

MAGNESITE.
(Dead Burned.)
American Refractories Co., Chicago, Ill.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Stowe-Fuller Co., Cleveland, O.

MAGNETS.
(Lifting.)
Cutler-Hammer Clutch Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.

METAL.
(Expanded.)
Youngstown Iron & Steel Co., Youngstown, O.

METALS.
(Antimony, Copper.)
Blackwell, Sons & Co., Ltd., Liverpool, Eng.

METAL AND TUBE STRAIGHTENERS.
Hemming Bros. Co., New Haven, Conn.

MILLS.
(Billets.)
Morgan Construction Co., Worcester, Mass.

MILLS.
(Continuous Rolling.)
Morgan Construction Co., Worcester, Mass.

MILLS.
(Wire Complete Equipment.)
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.
Waterbury Farrel Fdy. & Mch. Co., Wat'bry, Ct.

MODELS.
(Made to Order.)
Standard Pattern Works Co., Cleveland, O.

MOLDS.
(Ingot.)
Carnegie Steel Co., Pittsburg, Pa.
Interstate Foundry Co., Cleveland, O.
Lorain Casting Co., Lorain, O.
Marshall Foundry Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Youngstown Fdy. & Mch. Co., Youngstown, O.

MOTORS.
(Air.)
Detroit Hoist & Machine Co., Detroit, Mich.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

MOTORS.
(Electric D. C. and A. C.)
Crocker-Wheeler Co., Ampere, N. J.
Holt Electric Co., Milwaukee, Wis.
Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

MOTORS.
(Mill.)
Crocker-Wheeler Co., Ampere, N. J.
Holt Electric Co., Milwaukee, Wis.
Westinghouse Electric & Mfg. Co., Pittsburg.

MOVERS.
(Car.)
Atkins & Co., Inc., E. C., Indianapolis, Ind.

NAILS.
American Steel & Wire Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
LaBelle Iron Works, Steubenville, O.
Pittsburg Steel Co., Pittsburg, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

NUTS.
American Bridge Co. of New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Clark Bros. Bolt Co., Milldale, Conn.
Cleveland City Forge & Iron Co., Cleveland, O.
Columbus Bolt Works, Columbus, O.
Garland Nut & Rivet Co., Pittsburg, Pa.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Michigan Bolt & Nut Wks., Detroit, Mich.
Milton Mfg. Co., Milton, Pa.
Oliver Iron & Steel Co., Pittsburg, Pa.
Republic Iron & Steel Co., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scully Steel & Iron Co., Chicago, Ill.
Steel Car Forge Co., Pittsburg, Pa.
Upson Nut Co., Cleveland, O.

ORE.
(Chrome.)
American Refractories Co., Chicago, Ill.
Blackwell & Sons Co., Ltd., Liverpool, Eng.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Samuel, Frank, Philadelphia, Pa.

ORE.
(Iron.)
Blackwell Sons & Co., Ltd., Liverpool, Eng.
Breitung, E. N., & Co., Cleveland, O.
Corrigan, McKinney & Co., Cleveland, O.
Hanna, M. A., & Co., Cleveland, O.
Hillman & Son, J. H., Pittsburg, Pa.
Hyman-Michaels Co., The, Chicago, Ill.
LaBelle Iron Works, Steubenville, O.
Lea, J. Tatnall, & Co., Philadelphia, Pa.
Oglebay, Norton & Co., Cleveland, O.
Pickands, Brown & Co., Chicago, Ill.
Pickands, Mather & Co., Cleveland, O.
Snyder & Co., W. P., Pittsburg, Pa.
Tod-Stambaugh Co., Cleveland, O.

OVENS.
Koppers, H., Joliet, Ill.

OVENS.
(By-Products Coke Ovens.)
Koppers, H., Joliet, Ill.
United Coke & Gas Co., The, New York.

OVENS.
(Coke.)
Coal Distillation Co., New York, N. Y.
Koppers, H., Joliet, Ill.

OVENS.
(Coke, Special.)
Covington Machine Co., Covington, Va.

OVENS.
(Coke, with Recovery of By-Products.)
United Coke and Gas Co., New York.

OVENS.
(Core.)
Obermayer, S., Co., Cincinnati, O.

OXYGEN.
Davis, Bournonville Co., New York City.

PACKING.
Jenkins Bros., New York City.

PACKING.
(Rawhide Hydraulic.)
Chicago Rawhide Mfg. Co., Chicago, Ill.

PANS.
(Grinding.)
Phillips & McLaren Co., Pittsburg, Pa.

PATTERNS.
Standard Pattern Works Co., Cleveland, O.
Youngstown Fdy. & Mch. Co., Youngstown, O.

PENSTOCKS.
Struthers-Wells Co., Warren, Pa.

PERFORATING.
(Sheet Metal-Automatic, Screen Work.)
Turner, Vaughn & Taylor Co., Cuy'hoga Falls, O.

PILING.
(Steel Sheet Interlocking.)
Carnegie Steel Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Lackawanna Steel Co., New York City.

PINIONS.
Nuttall, R. D., Co., Pittsburg, Pa.
Van Dorn & Dutton Co., Cleveland, O.

PINIONS.
(Rawhide.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Ganschow, Wm., Co., Chicago, Ill.
New Process Rawhide Co., Syracuse, N. Y.
Nuttall, R. D., Co., Pittsburg, Pa.

PINS.
(Knuckle and Brake.)
Champion Rivet Co., Cleveland, O.
Oliver Iron & Steel Co., Pittsburg, Pa.

PINS.
(Pivot.)
Champion Rivet Co., Cleveland, O.

PIPE.
Bourne-Fuller Co., Cleveland, O.
LaBelle Iron Works, Steubenville, O.
National Tube Co., Pittsburg, Pa.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.
Riter-Conley Mfg. Co., Pittsburg, Pa.
Struthers-Wells Co., Warren, Pa.
U. S. Cast Iron Pipe & Fdy. Co., New York.
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE.
(Drill, Iron and Steel.)
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE.
(Drive, Iron and Steel.)
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE.
(Iron and Steel, Galvanized.)
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE.
(Line, Iron and Steel.)
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE.
(Riveted Steel.)
American Bridge Co. of New York, New York.
Cambria Steel Co., Johnstown, Pa.
Graver Tank Works, The Wm., Chicago, Ill.
Struthers-Wells Co., Warren, Pa.

PIPE.
(Second Hand.)
Foster Co., L. B., Pittsburg, Pa.

PIPE.
(Wrought Iron.)
Bourne-Fuller Co., Cleveland, O.
Central Tube Co., Pittsburg, Pa.
Pittsburg Piping & Equipment Co., Pittsburg.
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE WROUGHT.
National Tube Co., Pittsburg, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

PLANERS.
Cincinnati Shaper Co., Cincinnati, O.
Cleveland Punch & Shear Wks. Co., Cleveland.
Manning, Maxwell & Moore, Inc., New York.
McCabe, J. J., New York City.
Motch & Merryweather Mchy. Co., Cleveland.
Ryerson, Joseph T., & Son, Chicago, Ill.

PLANTS.
(By-Products Coke Ovens.)
Koppers, H., Joliet, Ill.

PLANTS.
(Galvanizing.)
Wilfong Iron Works Co., Philadelphia, Pa.

PLATE.
(Tin.)
American Sheet & Tin Plate Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Standard Tin Plate Co., Canonsburg, Pa.
Taylor, N. & G., Philadelphia, Pa.

PLATES.
American Rolling Mill Co., Middletown, O.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Empire Iron & Steel Co., Niles, O.
Hillman & Son, Pittsburg, Pa.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago, Ill.
Illinois Steel Warehouse Co., St. Louis, Mo.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
LaBelle Iron Works, Steubenville, O.
Lackawanna Steel Co., New York City.
Otis Steel Co., Cleveland, O.
Portsmouth Steel Co., Portsmouth, O.
Republic Iron & Steel Co., Chicago, Ill.
Ryerson, Joseph T., & Son, Chicago, Ill.
Seneca Iron & Steel Co., Buffalo, N. Y.
Taylor, N. & G., Co., Philadelphia, Pa.
Tennessee Coal, Iron & R. R. Co., B'm'g'm, Ala.
United Steel Co., Canton, O.
Wood, Alan, Iron & Steel Co., Philadelphia, Pa.
Worth Bros. Co., Coatesville, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

PLATES.
(Boiler and Tank.)
American Rolling Mill Co., Middletown, O.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Graver Tank Works, The Wm., Chicago, Ill.
Portsmouth Steel Co., Portsmouth, O.
Scully Steel & Iron Co., Chicago, Ill.
Worth Bros. Co., Coatesville, Pa.

PLATES.
(Felloe.)
Wrought Washer Mfg. Co., Milwaukee, Wis.

PLATES.
(Floor.)
Carnegie Steel Co., Pittsburg, Pa.
National Tube Co., Pittsburg, Pa.
Scully Steel & Iron Co., Chicago, Ill.

PLATES.
(Sheared.)
Allegheny Steel Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Carnegie Steel Co., Pittsburg, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Illinois Steel Co., Chicago, Ill.
Portsmouth Steel Co., Portsmouth, O.

PLATES.
(Tie.)
Illinois Steel Co., Chicago, Ill.
Lackawanna Steel Co., New York City.

WHERE TO BUY

PLATES.
(Universal.)
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburg, Pa.
Illinois Steel Co., Chicago, Ill.
United Steel Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

PLUMBAGO.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Obermayer, S., Co., Cincinnati, O.
Stevens, F. B., Detroit, Mich.

POINTERS.
(Wire Rod, Wire Mills.)
Turner, Vaughn & Taylor Co., Cuy'hoga Falls, O.

POWER EQUIPMENT.
American Stoker Co., New York, N. Y.

PRESSES.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Bliss, E. W., Co., Brooklyn, N. Y.
Chambersburg Engrg. Co., Chambersburg, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland.
Dreis & Krump Mfg. Co., Chicago, Ill.
Hydraulic Press & Mfg. Co., Mt. Gilead, O.
Lake Erie Engineering Works, Buffalo, N. Y.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Ryerson & Son, Jos. T., Chicago, Ill.
Tod Co., Wm., Youngstown, O.
Toledo Machine & Tool Co., Toledo, O.
United Engineering & Fdy. Co., Pittsburg, Pa.
Waterbury Farrel Fdy. & Mch. Co., Wat'bry, Ct.
Watson-Stillman Co., New York, N. Y.
Wood, R. D., Co., Philadelphia, Pa.

PRESSES.
(Forging.)
Garrison, A., Foundry Co., Pittsburg, Pa.
Tod Co., Wm., Youngstown, O.
United Engineering & Fdy. Co., Pittsburg, Pa.

PRESSES.
(Hydraulic.)
Hydraulic Press & Mfg. Co., Mt. Gilead, O.
Tod Co., Wm., Youngstown, O.
United Engineering & Fdy. Co., Pittsburg, Pa.
Watson-Stillman Co., New York, N. Y.

PRESSES.
(Power.)
United Engineering & Fdy. Co., Pittsburg, Pa.

PRESSES.
(Steam, Sleeves, Runner Brick, Nozzles and Tuyeres. Fire Brick Works.)
Turner, Vaughn & Taylor Co., Cuy'hoga Falls, O.

PRESSES.
(Trimming.)
Massillon Fdy. & Mach. Co., Massillon, O.

PRODUCERS.
(Gas.)
Bogart Gas Power Engrg. Co., Buffalo, N. Y.
Cooper, C. & G., Co., Mt. Vernon, O.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Hagan, Geo. J., Pittsburg, Pa.
Koppers, H., Joliet, Ill.
Morgan Construction Co., Worcester, Mass.
Struthers-Wells Co., Warren, Pa.
Wellman-Seaver-Morgan Co., Cleveland, O.

PULLEYS.
Jones & Laughlin Steel Co., Pittsburg, Pa.

PUMPS.
Aldrich Pump Dept., Allentown, Pa.
Cameron Steam Pump Works, New York City.
Chambersburg Engrg. Co., Chambersburg, Pa.
Dean Bros. Steam Pump Wks., Indianapolis.
Deming Co., Salem, O.
Lake Erie Engrg. Works, Buffalo, N. Y.
Prescott Steam Pump Co., Milwaukee, Wis.
Tod Co., Wm., Youngstown, O.

PUMPS.
(Boiler Feed.)
Cameron Steam Pump Wks., New York City.
Dean Bros. Steam Pump Wks., Indianapolis.
Deming Co., Salem, O.
McGowan, J. H., Co., Cincinnati, O.
Prescott Steam Pump Co., Milwaukee, Wis.

PUMPS.
(Compound.)
McGowan Co., J. H., Cincinnati, O.

PUMPS.
(Deep Well.)
McGowan Co., J. H., Cincinnati, O.

PUMPS.
(Electric Driven.)
Dean Bros. Steam Pump Wks., Indianapolis.
Deming Co., Salem, O.

PUMPS.
(Electric and Power.)
Aldrich Pump Dept., Allentown, Pa.
Dean Bros. Steam Pump Wks., Indianapolis.

PUMPS.
(Elevator.)
McGowan Co., J. H., Cincinnati, O.

PUMPS.
(Steam.)
Cameron Steam Pump Wks., New York City.
Dean Bros. Steam Pump Wks., Indianapolis.
Deming Company, The, Salem, O.
Pittsburg Valve, Fdy. & Const. Co., Pittsburg.
Prescott Steam Pump Co., Milwaukee, Wis.

PUMPS.
(Vacuum.)
American Compressor & Pump Co., Baltimore.
Cameron Steam Pump Wks., New York City.
Dean Bros. Steam Pump Wks., Indianapolis.
Mesta Machine Co., Pittsburg, Pa.

PUNCHES AND SHEARS.
Allen, John F., Co., New York City.
Alliance Machine Co., Alliance, O.
Bertsch & Co. Cambridge City, Ind.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Bliss, E. W., Co., Brooklyn, N. Y.
Cleveland Punch & Shear Wks. Co., Cleveland.
Covington Mch. Co., Covington, Va.
Long & Allstatter Co., Hamilton, O.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Massillon Fdy. & Mach. Co., Massillon, O.
Mesta Machine Co., Pittsburg, Pa.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Queen City Punch & Shear Co., Cincinnati, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Bridge Tool Co., Pittsburg, Pa.
Tod Co., Wm., Youngstown, O.
Toledo Machine & Tool Co., Toledo, O.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wood, R. D., & Co., Philadelphia, Pa.

PUNCHES.
(Hand.)
Bertsch & Co., Cambridge City, Ind.
Bourne-Fuller Co., Cleveland, O.

PUNCHES.
(Hydraulic.)
Tod Co., Wm., Youngstown, O.
Watson-Stillman Co., New York, N. Y.

PUNCHES.
(Multiple.)
Bertsch & Co., Cambridge City, Ind.
Bliss Co., E. W., Brooklyn, N. Y.

PUNCHES.
(Pneumatic.)
Allen, John F., Co., New York City.

PYROMETERS.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Philadelphia, Pa.
Stupakoff, S. H., Pittsburg, Pa.

RAILS.
Bourne-Fuller Co., Cleveland, O.
Buckeye Rolling Mill Co., Steubenville, O.
Cambria Steel Co., Johnstown, Pa.
Carnegie Steel Co., Pittsburg, Pa.
Foster Co., L. B., Pittsburg, Pa.
Green, L. A., Co., Pittsburg, Pa.
Hyman-Michaels Co., The, Chicago, Ill.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago, Ill.
Illinois Steel Warehouse Co., St. Louis, Mo.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Lackawanna Steel Co., New York City.
Republic Iron & Steel Co., Pittsburg, Pa.
Tennessee Coal, Iron & R. R. Co., Bm'gh'm, Ala.

RAILS.
(Relaying.)
Hyman-Michaels Co., The, Chicago, Ill.
Oakdale Iron Co., Chicago, Ill.

RAMMERS.
(Foundry.)
Ingersoll-Rand Co., New York.

REAMERS.
Cleveland Twist Drill Co., Cleveland, O.

RECEIVERS.
(Air.)
Ingersoll-Rand Co., New York.

REELS.
(Wood and Iron, Wire Mills.)
Turner, Vaughn & Taylor Co., Cuy'hoga Falls, O.

REGENERATORS.
Coal Distillation Co., New York, N. Y.

REGULATORS.
(Boiler Feed Water, Open Feed Water Heater and Pressure.)
Strong, Carlisle & Hammond Co., Cleveland, O.

REGULATORS.
(Speed.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.

RODS.
(Drill, Polished.)
Pittsburg Shafting Co. of Detroit, Detroit, Mich.

RIVETERS.
(Elastic Rotary and High Speed.)
Adt & Son, John, New Haven, Conn.
Hemming Bros. Co., The, New Haven, Conn.
Shuster Co., F. B., New Haven, Conn.

RIVETERS.
(Hydraulic.)
Chambersburg Engrg. Co., Chambersburg, Pa.
Mackintosh, Hemphill & Co., Pittsburg, Pa.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York, N. Y.
Wood & Co., R. D., Philadelphia, Pa.

RIVETERS.
(Pneumatic.)
Allen, John F., Co., New York City.
Cleveland Pneumatic Tool Co., Cleveland, O.
Ingersoll-Rand Co., New York.
Ryerson, Joseph T., & Son, Chicago, Ill.

RIVETS.
(Structural, Boiler, Ship.)
American Iron & Steel Mfg. Co., Lebanon, Pa.
Bourne-Fuller Co., Cleveland, O.
Champion Rivet Co., Cleveland, O.
Garland Nut & Rivet Co., Pittsburg, Pa.
Illinois Steel Co., Warehouse Dept., Chicago, Ill.
Illinois Steel Warehouse Co., St. Louis, Mo.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Michigan Bolt & Nut Works, Detroit, Mich
Oliver Iron & Steel Co., Pittsburg, Pa.
Progressive Mfg. Co., Torrington, Conn.
Republic Iron & Steel Co., Pittsburg, Pa.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Steel Car Forge Co., Pittsburg, Pa.
Upson Nut Co., Cleveland, O.

RODS.
(Iron and Steel.)
Amer. Iron & Steel Mfg. Co., Lebanon, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

RODS.
(Straightened and Cut.)
Youngstown Sheet & Tube Co., Youngstown, O.

RODS.
(Wire.)
Youngstown Sheet & Tube Co., Youngstown, O.

ROLLING MILL EQUIPMENT.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.

ROLLS.
(Bending and Straightening.)
Bertsch & Co., Cambridge City, Ind.
Morgan Engineering Co., Alliance, O.
Niles-Bement-Pond Co., New York City.
Queen City Punch & Shear Co., The, Cincinnati, O.
United Engineering & Fdy. Co., Pittsburg, Pa.

ROLLS.
(Sand Chilled and Steel.)
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Farrel Fdy. & Mach. Co., Ansonia, Conn.
Garrison Fdy. Co., A., Pittsburg, Pa.
Hyde Park Fdy. & Mch. Co., Hyde Park, Pa.
Mesta Machine Co., Pittsburg, Pa.
National Roll & Foundry Co., Avonmore, Pa.
Seaman-Sleeth Co., Pittsburg, Pa.
United Engineering & Fdy. Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.
Youngstown Fdy. & Mch. Co., Youngstown, O.

ROOFING.
(Corrugated.)
American Rolling Mill Co., Middletown, O.
Amer. Sheet & Tin Plate Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
Stark Rolling Mill Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

ROOFING.
(Iron and Steel.)
Amer. Bridge Co. of New York, New York.
American Rolling Mill Co., Middletown, O.
Amer. Sheet & Tin Plate Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
Massillon Rolling Mill Co., Massillon, O.
Newport Rolling Mill Co., Newport, Ky.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Iron & Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE.
(Wire.)
American Steel & Wire Co., Chicago, Ill.

RUNWAYS.
(Crane.)
Cleveland Crane & Engrg. Co., Wickliffe, O.
Toledo Bridge & Crane Co., Toledo, O.

SAND.
(Molding.)
Garden City Sand Co., Chicago, Ill.
Stevens, F. B., Detroit, Mich.

SATURATORS.
(Ammonia.)
Koppers, H., Joliet, Ill.

SAWS.
(Band.)
Atkins & Co., Inc., E. C., Indianapolis, Ind.
Fox Machine Co., Grand Rapids, Mich.

SAWS.
(Cold Metal.)
Atkins & Co., Inc., E. C., Indianapolis, Ind.
Espen-Lucas Machine Works, Philadelphia, Pa.
Newton Mch. Tool Wks., Inc., Philadelphia, Pa.
Starrett, L. S., Co., Athol, Mass.

SAWS.
(Hack.)
Atkins & Co., Inc., E. C., Indianapolis, Ind.

SAWS.
(Hot.)
Atkins & Co., Inc., E. C., Indianapolis, Ind.
Mesta Machine Co., Pittsburg, Pa.
United Engrg. & Foundry Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.

SCREW MCH. PRODUCTS.
Barnes Co., The Wallace, Bristol, Conn.

WHERE TO BUY

SCREWS.
Milton Mfg. Co., Milton, Pa.
Progressive Mfg. Co., Torrington, Conn.
Republic Iron & Steel Co., Pittsburg, Pa.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Upson Nut Co., Cleveland, O.

SCREWS.
(Set.)
Allen Mfg. Co., Inc., Hartford, Conn.

SEPARATORS (Centrifugal Oil).
American Tool & Machine Co., Boston, Mass.

SEPARATORS.
(Magnetic.)
Cutler-Hammer Clutch Co., Milwaukee, Wis.

SEPARATORS.
(Steam or Oil.)
American Blower Co., Detroit, Mich.
Strong, Carlisle & Hammond Co., Cleveland.

SHAFTING.
American Steel & Wire Co., Chicago, Ill.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Columbia Steel & Shafting Co., Pittsburgh, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Pittsburg Shafting Co. of Detroit, Detroit.
Republic Iron & Steel Co., Pittsburg, Pa.
Standard Gauge Steel Co., Beaver Falls, Pa.

SHAFTING.
(Turner.)
Columbia Steel & Shafting Co., Pittsburg, Pa.

SHAPERS.
Cincinnati Shaper Co. Cincinnati, O.
Cleveland Punch & Shear Wks. Co., Cleveland.
Manning, Maxwell & Moore, Inc., New York.
McCabe, J. J., New York City.
Motch & Merryweather Mach. Co., Cleveland.
Newton Mch. Tool Wks., Inc., Philadelphia, Pa.
Niles-Bement-Pond Co., New York City.

SHAPES. (Agricultural.)
Carnegie Steel Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Inland Steel Co., Chicago, Ill.
Republic Iron & Steel Co., Pittsburg, Pa.

SHAPES.
(Special Drawn.)
Columbia Steel & Shafting Co., Pittsburgh, Pa.
Pittsburg Shafting Co. of Detroit, Detroit.

SHAPES.
(Steel, Structural and Special Rolled.)
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Illinois Steel Co., Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

SHEARS.
(Angle and Plate.)
Bertsch & Co., Cambridge City, Ind.
Covington Machine Co., Covington, Va.

SHEARS.
(Billet, Bloom and Slab.)
Garrison, A., Foundry Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Wheeling Mold & Foundry Co., Pittsburg, Pa.

SHEARS.
(Flying and Bar.)
Morgan Construction Co., Worcester, Mass.

SHEARS.
(Lever.)
Bertsch & Co., Cambridge City, Ind.
Mesta Machine Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va.

SHEARS.
(Scrap, Alligator, Wire and Wire Nail Mills.)
Covington Mch. Co., Covington, Va.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

SHEARS.
(Squaring.)
Bertsch & Co., Cambridge City, Ind.
Bliss Co., E. W., Brooklyn, N. Y.
Garrison, A., Foundry Co., Pittsburg, Pa.
Mesta Machine Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.
Wheeling Mold & Fdy. Co., Wheeling, W. Va

SHEARS.
(Vertical).
Bertsch & Co., Cambridge City, Ind.
Mesta Machine Co., Pittsburg, Pa.
United Engrg. & Fdy. Co., Pittsburg, Pa.

SHEETS.
(Black Steel.)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Canton Sheet Steel Co., Canton, O.
Cincinnati Iron & Steel Co., Cincinnati, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
Ryerson, Joseph T., & Son, Chicago, Ill.
Stark Rolling Mill Co., Canton, O.
Youngstown Iron & Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS.
(Blue Annealed.)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg.
Bourne-Fuller Co., Cleveland, O.
Inland Steel Co., Chicago, Ill.
Portsmouth Steel Co., Portsmouth, O.
Stark Rolling Mill Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS.
(Corrugated.)
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg.
Bourne-Fuller Co., Cleveland, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Massillon Rolling Mill Co., Massillon, O.
Newport Rolling Mill Co., Newport, Ky.
Seneca Iron & Steel Co., Buffalo, N. Y.
Stark Rolling Mill Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS.
(Dead Soft for Stamping.)
Allegheny Steel Co., Pittsburg, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg.
Canton Sheet Steel Co., Canton, O.
Inland Steel Co., Chicago, Ill.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Stark Rolling Mill Co., Canton, O.
Youngstown Iron & Steel Co., Youngstown, O.

SHEETS.
(Deep Drawing Stock.)
Allegheny Steel Co., Pittsburg, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.
Cambria Steel Co., Johnstown, Pa.
Inland Steel Co., Chicago, Ill.
Massillon Rolling Mill Co., Massillon, O.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Youngstown Iron & Steel Co., Youngstown, O.

SHEETS. (Galvanized.)
Allegheny Steel Co, Pittsburg, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.
Bourne-Fuller Co., Cleveland, O.
Canton Sheet Steel Co., Canton, O.
Empire Iron & Steel Co., Niles, O.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Massillon Rolling Mill Co., Massillon, O.
Newport Rolling Mill Co., Newport, Ky.
Republic Iron & Steel Co., Pittsburg, Pa.
Seneca Iron & Steel Co., Buffalo, N. Y.
Stark Rolling Mill Co., Canton, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Iron & Steel Co., Youngstown, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS.
(Iron and Steel.)
Allegheny Steel Co., Pittsburg, Pa.
American Rolling Mill Co., Middletown, O.
American Sheet & Tin Plate Co., Pittsburg, Pa.
American Tube & Stamping Co., Bridgeport, Ct.
Bourne-Fuller Co., Cleveland, O.
Canton Sheet Steel Co., Canton, O.
Disston & Sons, Inc., Henry, Philadelphia, Pa.
Empire Iron & Steel Co., Niles, O.
Harvey, Arthur C., & Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago, Ill.
Illinois Steel Warehouse Co., St. Louis, Mo.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Massillon Rolling Mill Co., Massillon, O.
Phillips Sheet & Tin Plate Co., Weirton, W. Va.
Portsmouth Steel Co., Portsmouth, O.
Republic Iron & Steel Co., Pittsburg, Pa.
Ryerson, Joseph T., & Son, Chicago, Ill.
Seneca Iron & Steel Co., Buffalo, N. Y.
Stark Rolling Mill Co., Canton, O.
Taylor, N. & G., Co., Philadelphia, Pa.
Tennessee Coal, Iron & R. R. Co., Pittsburg.
Wood, Alan, Iron & Steel Co., Philadelphia, Pa.
Worth Bros. Co., Coatesville, Pa.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS.
(Open-Hearth.)
American Sheet & Tin Plate Co., Pittsburg, Pa.
Inland Steel Co., Chicago, Ill.
Stark Rolling Mill Co., Canton, O.
Youngstown Iron & Steel Co., Youngstown, O.

SHEETS.
(Pickled and Cold Rolled.)
American Sheet & Tin Plate Co., Pittsburg.
Canton Sheet Steel Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SHEETS.
(Polished.)
American Sheet & Tin Plate Co., Pittsburg.
Canton Sheet Steel Co., Canton, O.

SHEETS.
(Steel Box Annealed.)
American Sheet & Tin Plate Co., Pittsburg.
Canton Sheet Steel Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SHOVELS.
(Steam.)
Bucyrus Co., South Milwaukee, Wis.
Thew Automatic Shovel Co., Lorain, O.

SIFTERS.
(Sand.)
Whiting Foundry Equipment Co., Harvey, Ill.

SLABS.
Cambria Steel Co., Johnstown, Pa.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., New York City.
Portsmouth Steel Co., Portsmouth, O.
United Steel Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SLABS.
(Sheet.)
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Tennessee Coal, Iron & R. R. Co., B'm'g'm, Ala.
United Steel Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

SMOKE STACKS.
Freeman, S., & Sons Mfg. Co., Racine, Wis.

SOLENOIDS.
Stevens, F. B., Detroit, Mich.

SOAPSTONE.
Cutler-Hammer Clutch Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.

SPECIALTIES.
National Tube Co., Pittsburg, Pa.

SPECIALTIES.
(Metal.)
Wire Specialty Works, South Bend, Ind.

SPECIALTIES.
(Steam.)
Cameron Steam Pump Wks., New York City.
Dean Bros. Steam Pump Wks., Indianapolis.
National Tube Co., Pittsburg, Pa.
Strong, Carlisle & Hammond Co., Cleveland.

SPIEGELEISEN.
Pickands, Brown & Co., Chicago, Ill.

SPIKES.
American Steel & Wire Co., Chicago, Ill.
Cincinnati Iron & Steel Co., Cincinnati, O.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.

SPIKES.
(Screw.)
Illinois Steel Co., Chicago, Ill.
Steel Car Forge Co., Pittsburg, Pa.

SPLICES.
(Rail.)
Carnegie Steel Co., Pittsburg, Pa.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Lackawanna Steel Co., New York City.
Republic Iron & Steel Co., Pittsburg, Pa.

SPRINGS.
Barnes Co., The Wallace, Bristol, Conn.

SPRINGS. (Vanadium.)
American Vanadium Co., Pittsburg, Pa.

STACKS.
American Bridge Co. of New York, New York.
Struthers-Wells Co., Warren, Pa.

STAMPING.
Acklin Stamping Co., Toledo, O.
Sterling Machine & Stamping Co., The, Wellington, O.

STAMPING.
(Sheet Metal.)
Acklin Stamping Co., Toledo, O.
Bettcher Mfg. Co., Cleveland, O.
Wire Specialty Works, South Bend, Ind.

STAND-PIPES.
American Bridge Co. of New York, New York.

STARTERS.
(Electric Motor.)
Cutler-Hammer Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., Cleveland, O.
Westinghouse Electric & Mfg. Co., Pittsburg.

STEEL.
American Bridge Co. of New York, New York.
Andrews Steel Co., Newport, Ky.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Carnegie Steel Co., Pittsburg, Pa.
Disston & Sons, Inc., Henry, Philadelphia.
Franklin Steel Co., Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago.
Illinois Steel Warehouse Co., St. Louis, Mo.
Inland Steel Co., Chicago, Ill.
Interstate Iron & Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
La Belle Iron Works, Steubenville, O.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Otis Steel Co., Ltd., Cleveland, O.
Reliance Steel Casting Co., Pittsburg, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.
Ryerson, Joseph T., & Son, Chicago, Ill.
Swedish Iron & Steel Corp'n., New York.
Tennessee Coal, Iron & R. R. Co., B'm'g'm, Ala.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown, O.

STEEL.
(Axle.)
Automobile Mining Car.
Columbia Steel & Shafting Co., Pittsburg, Pa

STEEL.
(Cold Rolled.)
Bourne-Fuller Co., Cleveland, O.
Columbia Steel & Shafting Co., Pittsburgh, Pa.
Pittsburg Shafting Co. of Detroit, Detroit.
Scully Steel & Iron Co., Chicago, Ill.
Ward & Sons, Edgar T., Boston, Mass.

WHERE TO BUY

STEEL.
(Cold Drawn.)
Cambria Steel Co., Johnstown, Pa.
Columbia Steel & Shafting Co., Pittsburgh, Pa.
Pittsburg Shafting Co. of Detroit, Detroit.
Standard Gauge Steel Co., Beaver Falls, Pa.

STEEL.
(Electric.)
Illinois Steel Co., Chicago, Ill.

STEEL.
(High Speed.)
Allen, Edgar, & Co., Ltd., Boston, Mass.
Colonial Steel Co., Pittsburg, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL.
(Open-Hearth.)
Cambria Steel Co., Johnstown, Pa.
Illinois Steel Co., Chicago, Ill.
Portsmouth Steel Co., Portsmouth, O.

STEEL.
(Screw Stock.)
Columbia Steel & Shafting Co., Pittsburg, Pa.

STEEL.
(Structural.)
American Bridge Co. of New York, New York.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Johnstown, Pa.
Carnegie Steel Co., Pittsburg, Pa.
Empire Iron & Steel Co., Niles, O.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago, Ill.
Illinois Steel Warehouse Co., St. Louis, Mo.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburg, Pa.
Lackawanna Bridge Co., Buffalo, N. Y.
Lackawanna Steel Co., New York City.
McClintic-Marshall Const. Co., Pittsburg, Pa.
Republic Iron & Steel Co., Pittsburg, Pa.
Ryerson, Joseph T., & Son, Chicago, Ill.
Worden-Allen Co., Chicago, Ill.

STEEL.
(Squares.)
Franklin Steel Co., Franklin, Pa.

STEEL.
(Tool.)
Allen, Edgar & Co., Ltd., Boston, Mass.
Bethlehem Steel Co., So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Colonial Steel Co., Pittsburg, Pa.
Disston & Sons, Inc., Henry Philadelphia.
Firth-Sterling Steel Co., McKeesport, Pa.
Goedman, Maurice, New York, N. Y.
Ryerson, Joseph T., & Son, Chicago, Ill.
Vanadium Alloys Steel Co., Latrobe, Pa.
Ward & Sons, Edgar T., Boston, Mass.

STEEL.
(Twisted.)
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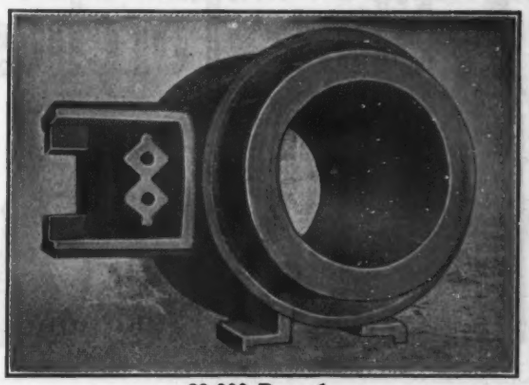
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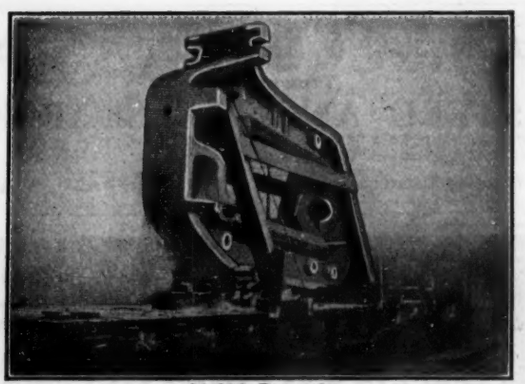
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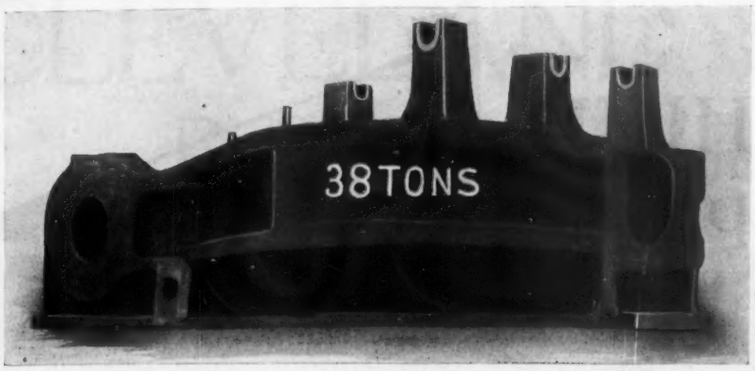

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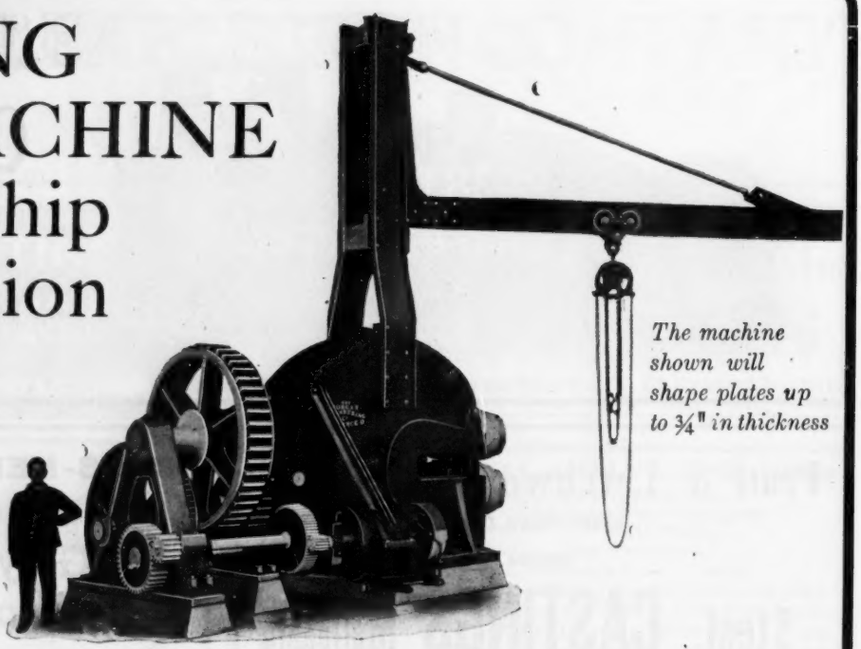

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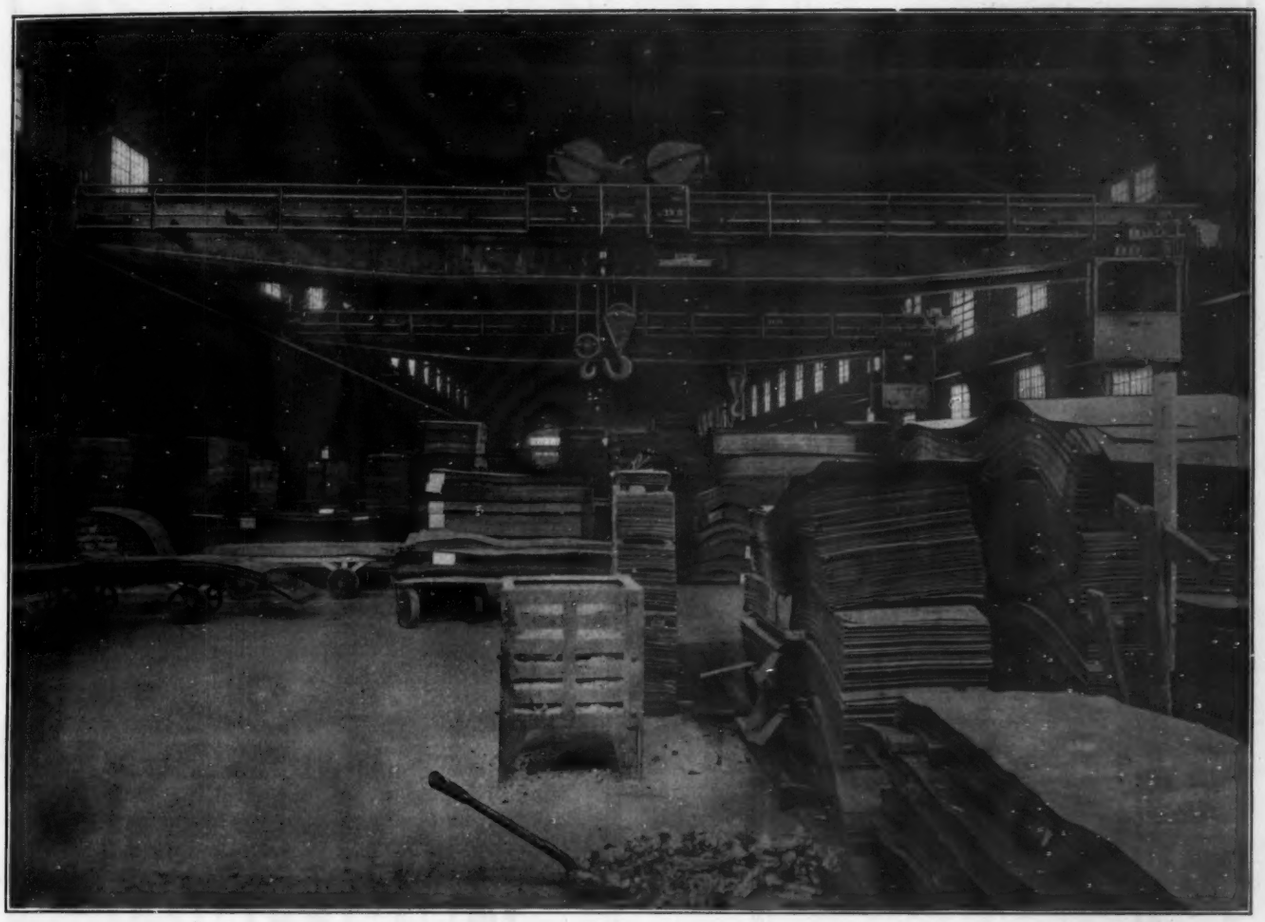

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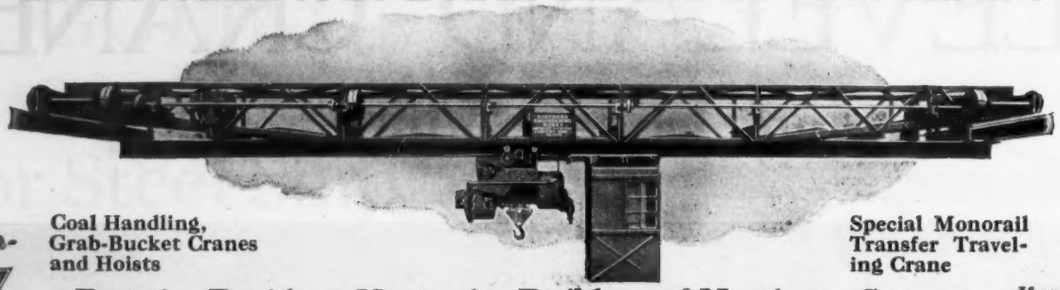

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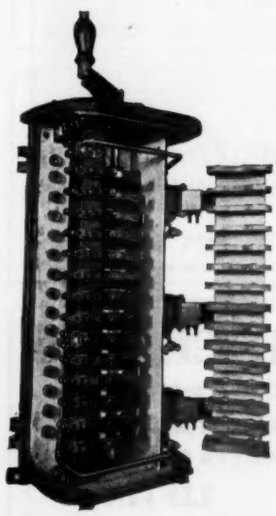

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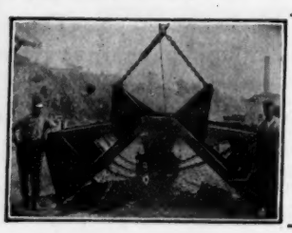

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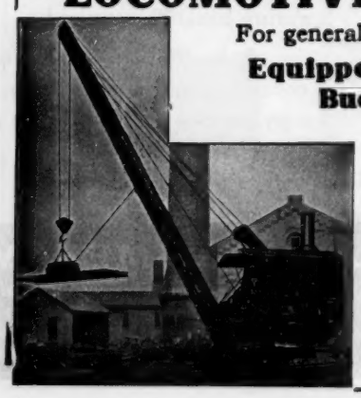

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A5

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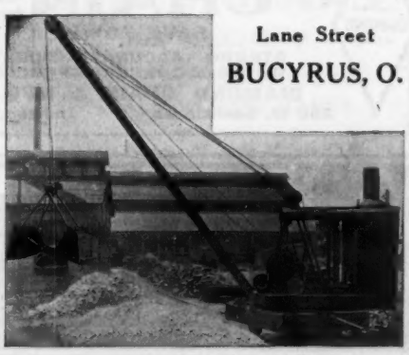

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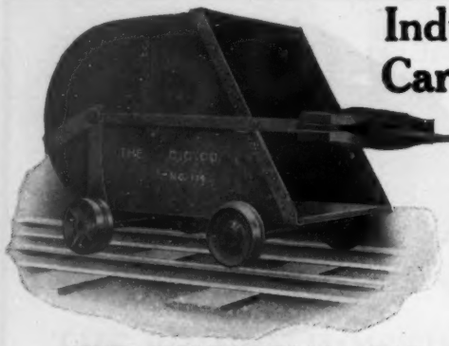

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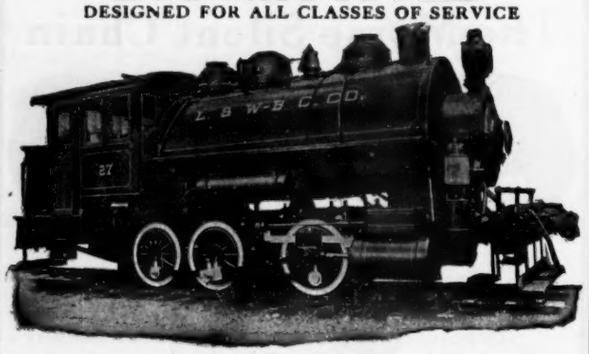

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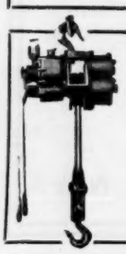

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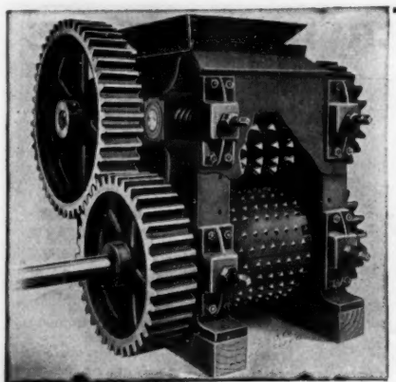

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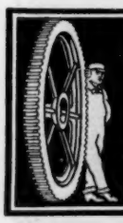

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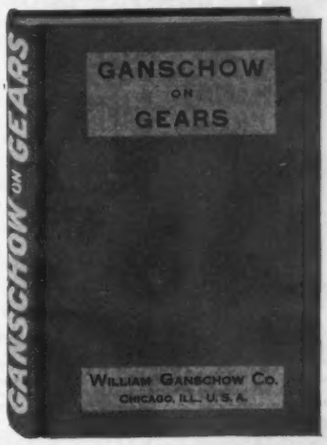

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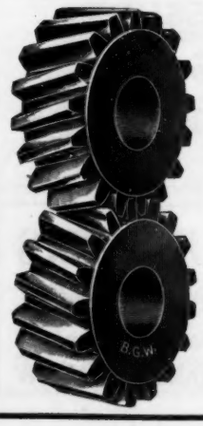

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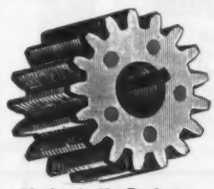

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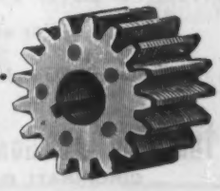

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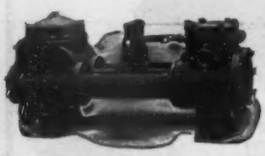

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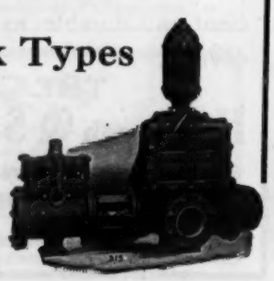

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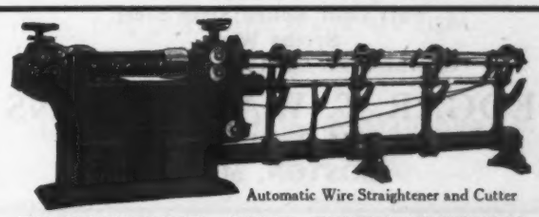

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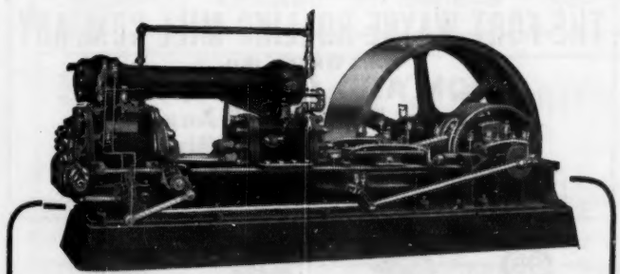

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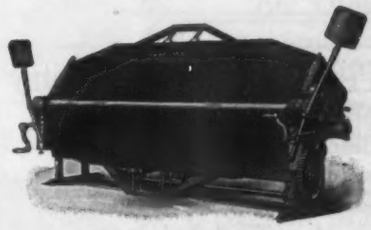

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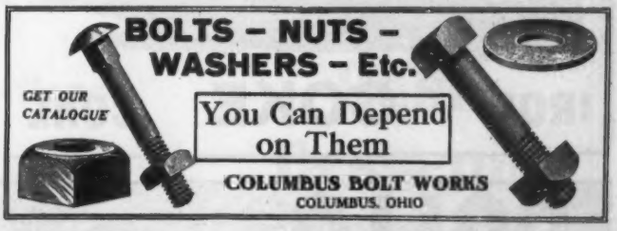

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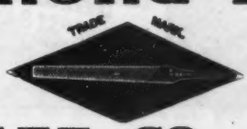

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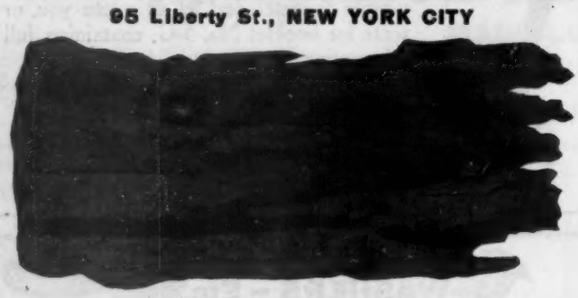

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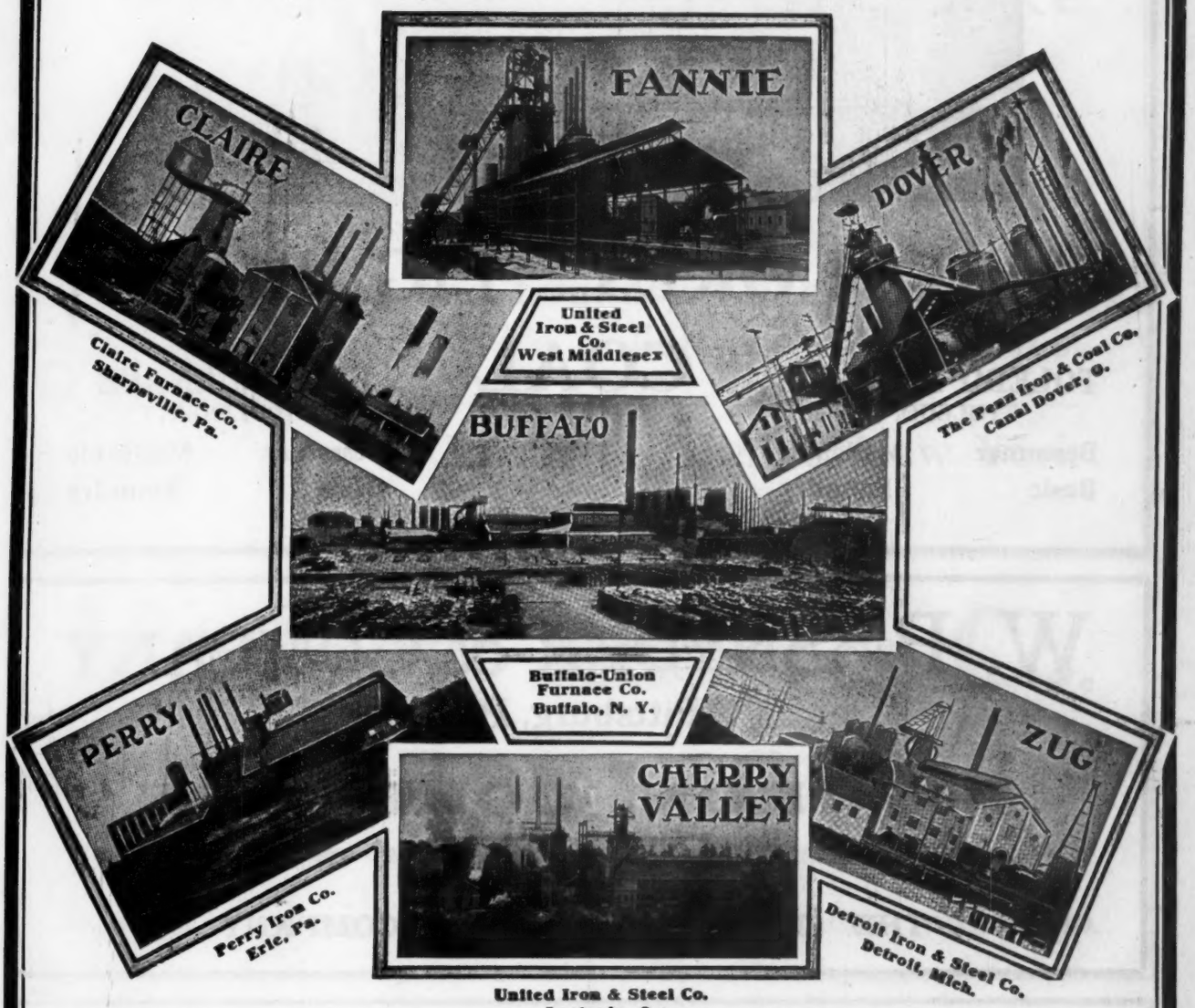

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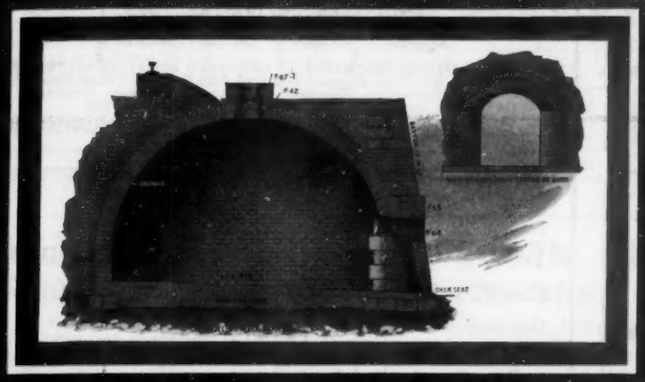

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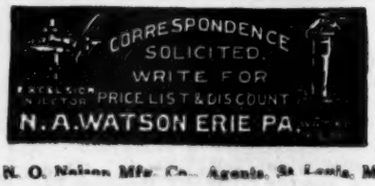

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In answering advertisements it is advisable to state whether foundry is Gray Iron, Malleable or Brass

Help Wanted

WANTED—AN EXPERIENCED FOUNDRY foreman for a steel foundry doing miscellaneous work. Applicant must be competent to estimate piece rates. State age, experience and salary expected. Also send references. Address Box 359, THE IRON TRADE REVIEW, Cleveland, O.

WANTED—MACHINE MOLDERS, NON-union. Good finishers. No trouble. Address Box 424, THE IRON TRADE REVIEW, Cleveland, O.

PRACTICAL FOUNDRYMAN WANTED, familiar with modern methods, to travel and sell to foundries a special article that involves improvement in the manufacture of a staple line. Good commissions. Address Box 491, THE IRON TRADE REVIEW, Cleveland, O.

WANTED—A FOREMAN FOR BRASS foundry, one who can show results in a foundry that melts from 3,000 to 5,000 pounds of good castings per day, mostly small work. State experience in full and salary expected in first letter. Address Box 486, THE IRON TRADE REVIEW, Cleveland, O.

WANTED — FOREMAN FIRE BRICK layer, competent to build crucible, melting and annealing furnace. Must be sober and industrious. State wages expected, age and experience. Address John B. Dampman, Reading, Pa.

FOUNDRY FOREMAN TO TAKE FULL charge of a foundry in Massachusetts with a usual output between 20 and 30 tons daily, high grade small and medium grey iron castings. Must be a thoroughly first class practical molder, with plenty of managerial and executive experience and ability. State age, education, experience, references, compensation expected, etc. Address Box 471, THE IRON TRADE REVIEW, Cleveland, O.

WANTED — FOREMAN FOR MOUNT-ing shop. A stove foundry in eastern Canada employing about 50 molders, wants a competent bright young man to act as foreman of their mounting shop under the superintendent. Must be capable of inspecting ranges, stove and furnace work. Apply with references and salary expected to "Canada", THE IRON TRADE REVIEW, Cleveland, O.

MOLDING MACHINE FOREMAN. WE want a man to take full charge of molding machines and get results from green men. Good opportunity for the right person. Address Box 476, THE IRON TRADE REVIEW, Cleveland, O.

ASSISTANT FOREMAN WANTED IN iron and bronze foundry. Applicant must have ample experience in both technical and practical details of foundry practice. Opportunity for ambitious high grade man with best references. Address Box 465, THE IRON TRADE REVIEW, Cleveland, O.

PATTERN SHOP FOREMAN ACCUS-tomed to turning out accurate wood patterns, for steel foundry making specialties and general railroad work. Must have executive ability, be familiar with up-to-date pattern shop and foundry methods and be a pusher. State age, experience and if married. Address "Pattern Foreman," THE IRON TRADE REVIEW, Cleveland, O.

WANTED—THOROUGHLY PRACTICAL molder on bench and floor work to act as instructor and speeder. Address Box 467, THE IRON TRADE REVIEW, Cleveland, O.

Help Wanted

WANTED — FIRST CLASS EXPERI-enced foreman for annealing department. Established malleable foundry on Mississippi river. Give full experience, age, and salary expected. Address Box 459, THE IRON TRADE REVIEW, Cleveland, O.

FOUNDRY FOREMAN WANTED TO take charge of jobbing foundry in Ohio making aluminum, brass castings, etc. Must be capable of operating molding machines to the best advantage. Must be energetic, sober and capable of obtaining large production. Address Box 460, THE IRON TRADE REVIEW, Cleveland, O., and give age, experience, references and salary desired.

WANTED — SUPERINTENDENT OR foreman to install and operate an 80 machine cement coated wire nail plant at Ellwood City, Pa. State what experience you have had—what salary you want. Communications confidential. American Steel Co., Park bldg., Pittsburgh.

WANTED — AT ONCE, EXPERIENCED draftsman for steel car work. Do not apply unless experienced on either steel or wood design. Address Box 504, THE IRON TRADE REVIEW, Cleveland, O.

WANTED—SALESMAN FOR CEMENT coated wire nails. Must have had experience. Give reference—name salary. All communications strictly confidential. American Steel Co., Park bldg., Pittsburgh, Pa.

SALESMAN — PITTSBURGH DISTRICT and western Pennsylvania; familiar with mill, shop and manufacturing trade in general; straight liberal commission. Address Box 533, THE IRON TRADE REVIEW, Pittsburgh.

WANTED — WORKING FOREMAN roll-turner, for shop containing three double lathes. Experienced in designing and turning shapes for rolling high-carbon steel. State wages expected, age and experience. John B. Dampman, Reading, Pa.

WANTED—FOUNDRY FOREMAN TO take charge of molding machine work in large gray iron foundry in eastern states. Must understand all branches, particularly best machine practice. Address E. G., care of THE IRON TRADE REVIEW, Cleveland.

CAMBRIA STEEL COMPANY, JOHNS-town, Pa. Desires experienced designers. No others need apply, for blast furnace and general rolling mill work. Positions will be permanent to satisfactory men. Address A. E. Peters, chief draftsman, stating age, experience, and salary wanted.

WANTED—BY A FIRST-CLASS CON-verter and crucible steel foundry, an ambitious energetic foundry foreman, one accustomed to details, who can handle 25 bench and floor molders, make match-plates, set piece work and able to rig up simple molding machine. Must be capable of assuming responsibility and a good judge of a day's work. Address Box 534, THE IRON TRADE REVIEW, Cleveland, O.

Positions Wanted

POSITION WANTED AS FOUNDRY foreman in malleable or gray iron foundry, up-to-date in foundry practice, 28 years' experience, married, strictly temperate, experienced on molding machines, open shop preferred. Address Box 29, THE IRON TRADE REVIEW, Cleveland, O.

Positions Wanted

POSITION WANTED AS FOUNDRY foreman. Experienced in heavy and light work. Twenty-five years' practical experience. Can produce the goods. Address Box 320, THE IRON TRADE REVIEW, Cleveland, O.

AS FOREMAN OF OPEN HEARTH steel foundry. 23 years' experience. Strictly sober. Best references. Address Box 367, THE IRON TRADE REVIEW, Cleveland, O.

FIRST-CLASS FOUNDRYMAN DESIRES position as Superintendent or Foreman. Has had wide successful experience. Can assume charge at once. Address Box 403, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED AS SUPERIN-tendent of Grey Iron Foundry. Competent, to look after every detail connected with the successful operation of a foundry. Molding machine expert, Melter and mixer. Good executive, Experience in Loam, Dry sand, and green sand molding. Hold responsible position at present. Address Box 418, THE IRON TRADE REVIEW, Cleveland, O.

HIGH GRADE FACTORY MANAGER is open for position. Four years general manager leading plant making plumbers' supplies, previous eight years general office and factory experience. Modern methods, economical tool design and production expert, up-to-date on costs and financial end of manufacturing. Age 31, energetic and thoroughly capable. Married man with best of references. Correspondence solicited. Address Box 401, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED AS FOUNDRY foreman by a practical foundryman of ability, wide experience on light-gray iron work, thoroughly familiar with molding machine practice and match-plates, up-to-date in cupola practice. Strictly sober and reliable. High grade references furnished. Address Box 434, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED AS FOREMAN OR superintendent by a young man of wide experience in green sand, dry sand or loam. Good executive ability, molding machine expert. Can mix iron by analysis. A-1 reference. Address Box 470, THE IRON TRADE REVIEW, Cleveland, O.

AN UP-TO-DATE PATTERN SHOP foreman experienced in wood and metal, with first class foundry experience is open for position. Address Box 472, THE IRON TRADE REVIEW, Cleveland, O.

PRACTICAL FOREMAN IN CHIPPING and cleaning department, also yard, desires to get in touch with reliable firm who is in need of a first class man. Address Box 475, THE IRON TRADE REVIEW, Cleveland, O.

WANTED — POSITION AS FOUNDRY foreman, 32 years of age, and married. Have had 15 years of experience in foundries manufacturing stove plate steam and hot water boilers and cast iron soil pipe and fittings. Thoroughly understands handling labor and mixing of iron. Have had entire charge of molding department, where 100 molders were employed. In reply address "J. F." THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED BY FOUNDRY foreman, 37 years of age, strictly temperate, energetic and a hustler. Handle men in first class manner and show results. Address Box 473, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED AS FOREMAN by an up-to-date malleable iron man familiar with molding machinery, reference furnished, can get good results. Address Box 474, THE IRON TRADE REVIEW, Cleveland, O.

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UP-TO-DATE FOUNDRY SUPERINTENDENT or foreman open for engagement Dec. 1. Address Box 478, THE IRON TRADE REVIEW, Cleveland, O.

PRACTICAL SUPERINTENDENT DESIRES to correspond with stove and range manufacturers contemplating a change in management of their plants, at present employed but will be at liberty Jan. 1, 1912. Address "Practical", THE IRON TRADE REVIEW, Cleveland, O. p.

POSITION WANTED BY FOUNDRY foreman, agricultural line preferred. 26 years experience, 9 years as foreman. Up-to-date in cupola and foundry practice. Understand molding machines, money saver, married. Address Box 464, THE IRON TRADE REVIEW, Cleveland, O.

POSITION AS FOUNDRY FOREMAN, gray iron, machine, heater or agricultural. 20 years experience as core maker, molder and foreman. Can give references. New York, Michigan or Ohio preferred. Address Box 463, THE IRON TRADE REVIEW, Cleveland, O.

FINISHED PATTERN-MAKER AND draughtsman wants responsible position in southern California, southwest or on foreign contract. Address Box 461, THE IRON TRADE REVIEW, Cleveland, O.

AS FOREMAN PATTERNMAKER BY first class man. Experienced in both metal and wood. Good executive. Best of testimonials and references. Automobile and general foundry work as specialties. Address Box 468, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED AS FOREMAN of crucible steel foundry, 25 years practical experience, hustler, will take hold and make things go, sober, ambitious. Address Box 488, THE IRON TRADE REVIEW, Cleveland, O.

POSITION AS FOUNDRY SUPERINTENDENT or foreman, malleable or gray iron. Mix metal by analysis. Friendly to molding machines. Competent to install new plants on a modern basis. Address Box 489, THE IRON TRADE REVIEW, Cleveland, O.

FOREMAN PATTERNMAKER WITH 10 years experience as foreman on wood and metal patterns, thoroughly up-to-date on molding machines and modern foundry practice, open for position. Address Box 490, THE IRON TRADE REVIEW, Cleveland, O.

GENERAL GRAY IRON FOUNDRY foreman wishes to make a change the first of year. Wide experience on gas engine work, American, steady and reliable. Preference vicinity of Pasadena, Cal. Address "General" THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED BY FIRST CLASS coremaker as coreroom foreman. 15 years experience, 8 years as foreman on most all classes of work. Address Box 487, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED BY IRON FOUNDRY foreman, light or heavy, molder by trade. Expert on molding machines. From Philadelphia district. Address Box 484, THE IRON TRADE REVIEW, Cleveland, O.

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YOUNG MAN WELL UP IN STEEL casting practice especially melting desires change. Wish position as superintendent or assistant of steel casting plant. Will correspond with any reliable party who is looking for a man. Address Box 493, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED AS GENERAL foreman, up-to-date in foundry practice, am young and married. Address Box 494, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED BY YOUNG MAN as assistant chemist in large steel works or foundry laboratory. Four years experience. References. Address Box 545, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED IN STEEL works or foundry as designer, foreman or assistant to superintendent. I have 14 years experience and am a graduate from school of mines. Address "New Year," THE IRON TRADE REVIEW, Cleveland, O.

SITUATION WANTED BY ENGINEERing blacksmith. Experienced, steady work preferred. English. Address Box 510, THE IRON TRADE REVIEW, Cleveland, O.

Business Opportunities

COMPLETE SETS OF WORKING drawings for the Murphy Patent Jarring Machines. Any size, single or multiple cylinders. Build your own and pay but one price. In constant use 3 years. Simple, economical and durable. Prices $25.00 and upwards. Jas. A. Murphy, Hamilton, Ohio.

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WANTED—PARTNER WITH $25,000 TO $50,000 in established firm of highest standing. Makes standard iron specialties, annual capacity nearly $300,000. Also another opening at $5,000. Write James H. Logan, 237 Fourth avenue, Pittsburgh, Pa.

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$100,000 WANTED BY INCORPORATED company now established, having Gate Valve and Globe Valve of high merit "Patented," money required to purchase plant and manufacture our own product, thus saving intermediate profit. Associates are of high standing and mechanical ability. Correspondence wanted with capitalist. Address "Progress," THE IRON TRADE REVIEW, Cleveland, O.

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PARTIES DESIROUS OF ENGAGING in the brass business to manufacture valves and plumbers' supplies, can secure the services of a competent superintendent by addressing G. E. M., care of THE FOUNDRY, Cleveland, O.

FOR SALE — LONG ESTABLISHED and well known line of wood working machinery, consisting of planers and matchers, surface planers, jointers, band saws, variety saws, swing saws, wood turners, lathes, etc. Patterns, jigs and good will, also machine shop tools of this business offered at very reasonable price. Splendid opportunity to secure a live business at low cost. Address "Wood Working Machinery", THE IRON TRADE REVIEW, Cleveland, O.

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WANTED THE FOLLOWING IN SECond-hand and must be in first-class condition. State full particulars. 1 pressure blower to deliver about 65 cu. feet of air per minute; 1 cupola to line up 48 inches to 54 inches inside; 1 battery of 6 or 8 steel exhaust mills including dust arrester and exhaust fan. Address Box 426, THE IRON TRADE REVIEW, Cleveland, O.

WANTED—PLATED PATTERNS AND iron core boxes of standard weight, Brass GLOBE and ANGLE VALVES, also standard weight and extra heavy Brass Gate Valves. State particulars and price. Address "Patterns," THE IRON TRADE REVIEW, Cleveland, O.

WANTED—Truck for loading pots in malleable iron annealing ovens. Give particulars and price. Address Box 416, THE IRON TRADE REVIEW, Cleveland, O.

FOR SALE—USED MACHINE TOOLS. Send for our list P-21, and let us know your requirements. Jos. T. Ryerson & Son, Chicago, Ill. p.

STEEL TANKS WANTED—7,000, 3,000, 1,000 gallons. Address Western Conduit & Mfg. Co., Chicago, Ill. p.

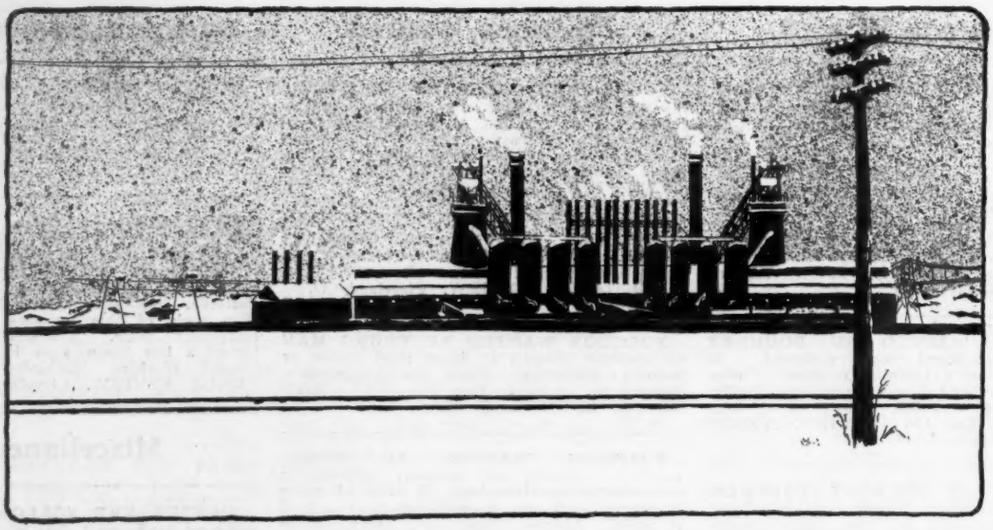
WOULD LIKE TO BUY MOLDING machines in first class condition. Reply with full particulars to Box 466, THE IRON TRADE REVIEW, Cleveland, O.

WANTED—CORE WIRE STRAIGHTENing machine, second hand. State size, condition and best price. Address Box 485, THE IRON TRADE REVIEW, Cleveland, O.

FOR SALE—ONE MONARCH CINDER crusher in first-class condition. Lumen Bearing Co., Sycamore and Belt Line Tracks, Buffalo, N. Y.

FOR SALE—10-TON STEEL CORE OVEN cars with racks. Address Box 492, THE IRON TRADE REVIEW, Cleveland, O.

WANTED—TABOR POWER SQUEEZERS, second-hand. Must be in first class condition. Address Box 499, THE IRON TRADE REVIEW, Cleveland, O.



At this holiday time it is fitting to pause in the strife of trade and partake, each to his fancy, of this joyous season with its cheer and good wishes; ¶ To stand at the end of the year's tasks and obligations—confident, thankful for experience, and hopeful; ¶ To look forward, clear-eyed and expectant—trustful in the great possibilities of the future; ¶ To feel that, whatever the results, one's best efforts with brain and hand have been extended; ¶ These things are worth while; ¶ That these, the Holiday Spirit, and a New Year better than all before, may become a realization to you is the sincere wish of

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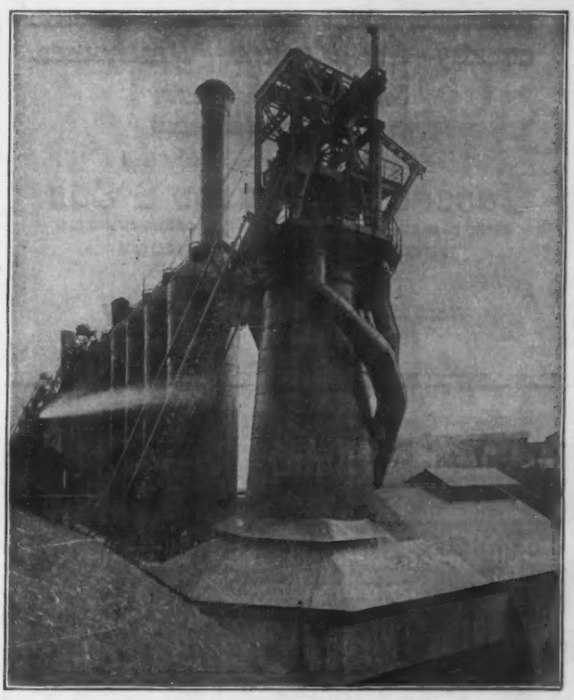

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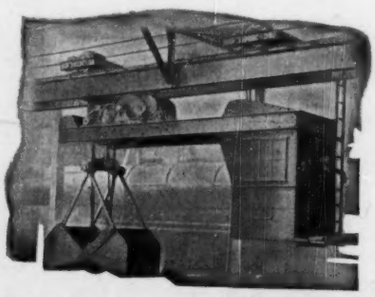

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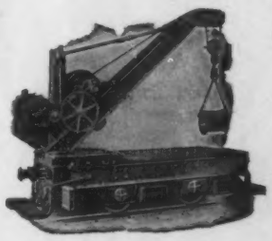

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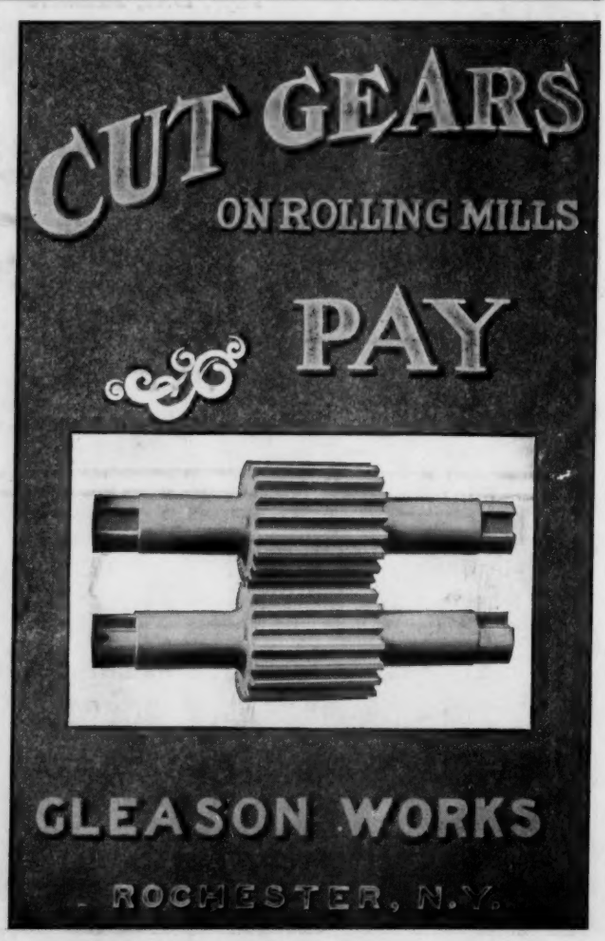
We can supply every kind and size of iron and steel in any quantity, also pig-iron and coke. Warehouse-shipments made on the day your order is received.

Write for Monthly Stock List and see our advertisement on page 5.

THE
BOURNE-FULLER CO
Iron, Steel
Pig-Iron
Coke
CLEVELAND
Pittsburgh Cincinnati St. Louis